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ABSTRACT

This guide, a revision of the 1985 manual, Archeology Is More than a Dig, is designed to help teachers use archaeology in the classroom and can be used with several disciplines to integrate learning in the elementary classroom. Designed for fifth-grade students, the lessons can be adapted to fit the appropriate skill level of students. Divided into eight sections, section 1, "Archaeology and Archaeologists," discusses the discipline of archaeology and how and why people become archaeologists. Section 2, "Doing Archaeology," explains how archaeology is done, from survey to excavation to analysis and interpretation. Section 3, "Cultures of the Past," is a summary of the prehistoric and historic cultures in southern Arizona. Section 4, "Teaching Archaeology," discusses concepts that can be emphasized in the classroom. Section 5, " Protecting Our Heritage," discusses the responsibilities of all citizens in protecting the past. Section 6, "Resources," includes an annotated list of suggested reading and audiovisual materials, as well as references used in preparing the text. Section 7, "Glossary," defines archaeological terms. Section 8, "Activities," includes instructions for activities that can be used in the classroom and answers to questions on illustrations for sections 1 and 2. (EH)

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ARCHAEOLOGY:

WINDOW ON THE PAST

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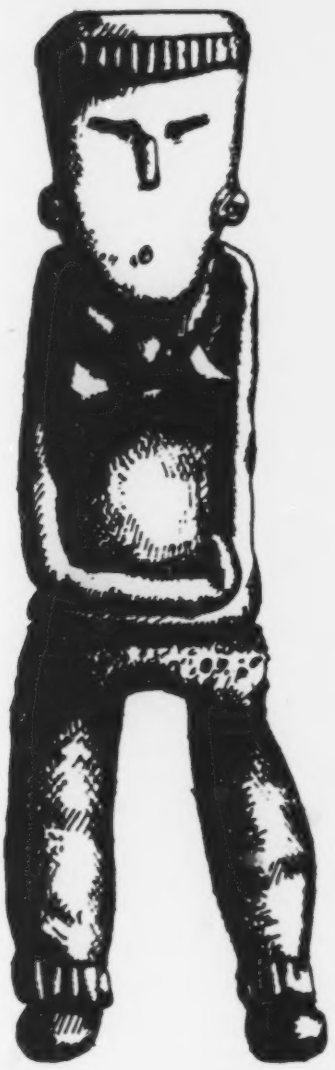

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Cooper Environmental Science Campus
Tucson Unified School District
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1992

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ARCHAEOLOGY: WINDOWS ON THE PAST

by Lee Fratt and Linda Gregonis

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ARCHAEOLOGY: WINDOW ON THE PAST

A Guide for Teachers and Students

Linda Gregonis and Lee Fratt

May 1992

Illustrations by
Lee Fratt and Ron Beckwith

Revised August 1994

PREFACE AND ACKNOWLEDGMENTS

Archaeology: Window on the Past is a revision of the 1985 manual, *Archaeology Is More Than a Dig*, by Jody Simmons, Larry Tanner, Sharon Urban, and Lou Ellen Watts. Like the first manual, this guide is designed to help teachers use archaeology in the classroom. Because archaeology borrows from many disciplines, it can be used to integrate the elementary school curriculum of mathematics, science, social science, language arts, art, and environmental education. Even physical education can play a role if you choose to prepare a sand box dig or participate in TUSD's archaeology program at Cooper Environmental Science Campus. By peering into the mysteries of the human past, archaeology can help children hone critical and higher-level thinking skills, and will encourage them to develop an appreciation for other cultures and to recognize the importance of protecting and preserving Arizona's rich cultural heritage for the future.

We have prepared the text of this guide with a fifth-grade audience in mind. Teachers may photocopy any part of the text and activities for direct use by their students, or can treat it as background material for their own use. The guide is divided into eight sections: **Section A: Archaeology and Archaeologists** discusses the discipline of archaeology and how and why people become archaeologists. **Section B: Doing Archaeology** explains how archaeology is done, from survey to excavation to analysis and interpretation. **Section C: Cultures of the Past** is a summary of the prehistoric and historic cultures in southern Arizona. **Section D: Teaching Archaeology** discusses concepts that can be emphasized in the classroom; **Section E: Protecting Our Heritage** discusses the responsibilities of all citizens in protecting our past. **Section F: Resources** includes an annotated list of suggested reading and audiovisual materials as well as the references used in preparing the text. In **Section G: Glossary,** archaeological terms are defined. The final portion, **Section H: Activities,** includes instructions for activities that can be used in the classroom. Terms that refer to important aspects of archaeological research appear in bold face print. Some, but not all, of these words appear in the Glossary. If the term represents an important vocabulary word or archaeological concept, it is also listed in the Glossary. More familiar terms do not appear in the Glossary.

We put the guide in a loose-leaf binder so that changes can be made to the text and other sections as needed and so that activities can be added or deleted as they are "tested" in the classroom. We especially need your help in developing or finding good activities. Your criticisms and ideas are most welcome.

Our thanks to Rick Larson, Doris and Doug Evans, Jan Mitich, and Alice Holmes for their support, ideas, and encouragement. In addition to her moral support and excellent critical comments, Doris also spent many hours formatting the manual and printing it on her laser printer. We appreciate the time spent by Sharon Urban, Rich Lange, Barb Gronemann, and Al Dart in reviewing the first version of this manual; we have incorporated many of their suggestions.

We thank the Educational Enrichment Foundation and the Arizona Archaeological Council for providing funding to prepare this guide. And last, but not least, we are grateful to Larry Tanner, Lou Ellen Watts, Jody Simmons, and Sharon Urban for initiating the archaeology program at Tucson Unified School District's Environmental Education Campus.

CONTENTS

Preface and Acknowledgments

Section A: Archaeology and Archaeologists
- What Is Archaeology?
- Who Are Archaeologists?
- Why Study Archaeology?
- History and Prehistory
- Subfields of Archaeology
- Why Is Archaeology Important?
- Clues to the Past
- Principles of Archaeology

Section B: Doing Archaeology
- Surveying and Recording Sites
  - Finding Sites
  - Recording Sites
  - Remote Sensing and Other Information
- Excavation
  - Which Site to Dig
  - Records, Records, Records
  - Grids
  - Depth
  - Digging, Observing, and Recording
  - Bagging and Labeling
  - The End of a Dig
- Cleaning, Labeling, and Sorting Artifacts
- Analysis
- Dating the Site
  - How Old Is It?
  - Archaeology and Dating
    - Relative Dating Techniques
    - Absolute Dating Techniques
- Interpretation
- Writing Reports
- Taking Care of Artifacts

More Information on Doing Archaeology

Section C: Cultures of the Past
Crossing the Bridge
Mammoth Hunting
End of the Ice Age
America's First Farmers
Villages
Hohokam: Desert Farmers
Changes in the Hohokam World
New Peoples
Historic Times
More Information on Cultures of the Past
When in the World

Section D: Teaching Archaeology
Archaeology and Culture
Doing Research
Before Doing Archaeology
After Doing Archaeology

Section E: Protecting Our Heritage
Site Stewards
Laws

Section F: Resources
Books and Other Reference Materials
References Used in Preparing the Guide

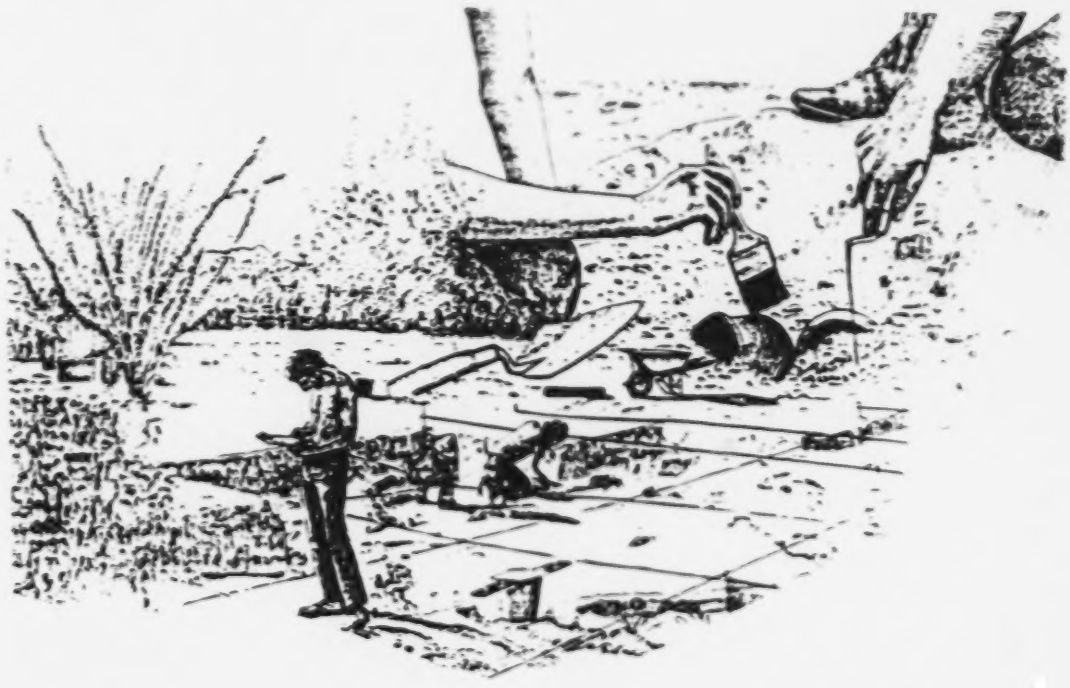
Section G: Glossary

Section H: Activities

Analyzing, Mapping, and Interpreting
Today's Artifacts
Capsule of America
Newspaper Artifacts
Story in a Bag
Food
Food Preservation
Decomposition
Ceramic Reconstruction
Sites and Threats
Oral History
Hohokam Dancing
Strings and Things
Natural Resources
Dating With Tree Rings (Dendrochronology)
How Do You Measure Up?
Motel of the Mysteries
Cultural Universals
Mapping
Archaeology Word Search
Answers to Questions on the Illustrations

SECTION A

ARCHAEOLOGY AND ARCHAEOLOGISTS



WHAT IS ARCHAEOLOGY?

Archaeology is the study of the human past using information from the things and structures that people used and then threw out or left behind. According to the dictionary, "archaeo" is from the Greek word "archaios," which means "ancient," and "ology," which means "the study of." Archaeology combines history and science to reconstruct and explain past cultures and events.

The term "archaeology" is often used incorrectly to refer to the study of the past in general, including the period when dinosaurs roamed the earth. Because archaeology is the study of the human past, archaeologists do not study dinosaurs. There were about 64 million years between the time of dinosaur extinction and the appearance of the earliest human ancestors, so humans and dinosaurs did not coexist — they did not live together in the same time and place. Hunting for dinosaurs is the job of **paleontologists,** scientists who study ancient forms of life. The fields of archaeology and paleontology do overlap, however, when extinct animals, such as mammoths, are found in archaeological sites.

To some people, the word archaeology conjures up the search for treasure. Those people have watched the Indiana Jones movies too many times! Archaeologists do sometimes find treasure. In the eighteenth, nineteenth, and early twentieth centuries, many archaeologists searched for unusual or beautiful artifacts — their idea of treasure — to put on display in museums. But modern archaeologists do not deliberately set out to find gold and jewels. Instead, they look for places where people once lived, in order to study how those people made a living — what they ate, what kinds of houses they lived in, how they buried their dead, and what kinds of tools they used. In other words, archaeologists are interested in reconstructing and explaining the cultures and events of the people who lived before us.

In the United States, archaeology is part of **anthropology.** (This is different from Europe, where archaeology is considered to be a branch of history.) Anthropology is the study of humans and cultures in the past and present. It is made up of four subfields — archaeology, cultural anthropology, linguistics, and physical anthropology [Figure A.a.]. Cultural anthropologists study the culture of present-day human societies. **Culture** includes the distinctive ways people in different societies think and behave. Linguistic anthropologists study the great variety of human languages and how people communicate. Physical anthropologists study human evolution and the physical differences among groups of people, like eye and skin color, height, and bone structure. Thus, anthropologists study human variation in all its forms — differences in culture, language, physical appearance, and past experiences.

WHO ARE ARCHAEOLOGISTS?

Archaeologists are trained scientists and professionals. Although anyone can participate in an archaeological study, not everyone is an archaeologist. To be an archaeologist requires formal training, usually at a college or university. Being an archaeologist means accepting responsibility. Just because someone excavates a site or knows something about artifacts does not make him or her an archaeologist. Archaeologists have the responsibility of making the results of their work available to other archaeologists and to the public. That is why archaeologists do not keep the artifacts they find, but place them in museums along with their notes, photographs, and other documents. This way, other archaeologists also have access to the

artifacts and information, and the museum can use this information and artifacts to develop displays for the public to see and appreciate.

Archaeologists recover many different kinds of artifacts — too many for every archaeologist to be able to identify. So, many archaeologists become specialists in identifying and analyzing one or two kinds of artifacts. Some artifact analyses, such as radiocarbon and archaeomagnetic dating, are very specialized and require the use of extremely expensive and precise equipment. In order to do these kinds of analyses, archaeologists must send samples off to special laboratories.

Because so many specialists are involved in archaeological research, archaeology is considered to be an interdisciplinary science. Scientists from many different fields, such as biology, anatomy, chemistry, and geology, may all work together on a single project. One of the most important things that a professional archaeologist must learn is how to coordinate and cooperate with other scientists.

Avocational archaeologists (also called amateurs) and pothunters also excavate sites, but for very different reasons. **Avocational archaeologists** are similar to professional archaeologists because they want to learn about the human past. Many avocational archaeologists assist professional archaeologists in surveying, excavating sites, and analyzing artifacts. Unlike professional archaeologists, avocational archaeologists may or may not have formal training and do not make their living by doing archaeology.

Pothunters create problems because unlike professional and avocational archaeologists, they are not interested in excavating sites to learn about the past. Pothunters excavate sites for personal gain [Figure A.b.]. That is, pothunters excavate sites to obtain artifacts that they can sell for money or add to their personal collections. Pothunters ignore laws that prohibit excavating sites on city, county, state, and federal land. They may sell artifacts to collectors who ignore laws that prohibit bringing foreign antiquities, such as Olmec jade from southern Mexico or mummies from Egypt, into the United States.

Rather than excavating carefully to get as much information about a site as they can and keeping complete records about how the excavation was done and what was found, pothunters may even bulldoze sites to get as many artifacts as possible. They record nothing. Some archaeologists have estimated that in New Mexico, pothunters destroy one site every day.

Who would buy artifacts from a pothunter? Certainly not us and we hope, not you. Unscrupulous private collectors and, unfortunately, some museums buy pothunted artifacts. Sometimes, the collector or the museum does not even realize that the beautiful Mimbres bowl or Clovis point that they want to purchase was looted from a site. Sometimes they know but don't care. And sometimes, private collectors pay a pothunter to purposefully loot a site!

Whom does this activity hurt? Everyone, including the pothunter, the collector, and the museum. Because every time a site is looted, clues to the unwritten past are lost. For example, the Mimbres people, who lived in southwest New Mexico from about A.D. 900 to A.D. 1150, made beautiful black-on-white pottery bowls [Figure A.c.]. Because these bowls can be sold for thousands of dollars, almost all of the Mimbres sites have been bulldozed and destroyed by pothunters. As a result, archaeologists know very little about the people who made this beautiful pottery and pieces of our past have been lost forever.

WHY STUDY ARCHAEOLOGY?

Have you ever wondered where your grandparents came from, how your mother and father met, what it would have been like to have fought in the Revolutionary War or the Civil War, or how people were entertained or got information before television or radio? Many people are curious about what life was like for other people in different places and at different times. You can ask your grandparents about where they came from and your parents about how they met. You can read letters from soldiers who fought in the American Revolution or the Civil War. And your parents, grandparents, or great-grandparents might remember what life was like before television. But what was life like before radio? You may be able to find some old letters or diaries that describe how people entertained themselves before radio, but most people do not bother to write about daily activities. People tend to write about the unusual things that cause them great joy, sorrow, or excitement. Or they write about important, extraordinary events.

How would you find out what is was like to hunt, kill, skin, and eat a mammoth? There is no one around today who can tell you what it was like to kill a mammoth (and if someone says that they can, you should be very skeptical). No one wrote about skinning mammoths or eating mammoth meat because when mammoths were around, people had not yet developed writing. The only way to learn about the unwritten past is to do archaeology.

HISTORY AND PREHISTORY

What do we mean by "the unwritten past?" Both history and prehistory involve the study of the human past. But the sources of information are different. History, the better known way of studying the past, uses information from written records. All kinds of documents are used, including diaries and letters, tax and business records, newspapers and magazines, land office records, and rolls of births, baptisms, marriages, and deaths.

Although it may seem that written documents would make history easier to write or would produce a more accurate picture of the past, this is often not the case. Obtaining information from documents can be very difficult. Different records may contain contradictory information about the same subject and sources often have built-in biases that must be discovered and evaluated. Also, there are large gaps of missing information. History books often tell about the lives and contributions of "Great Men" and "Great Events." These histories leave out information about the daily lives of most of the people as well as information about minority or ethnic groups.

For example, many southern plantation slaves could not write, so most of the information recorded about them and their way of life was written by slave owners or other educated people who were not slaves. You can imagine how many wrong "facts" have gotten into the history books. Recent excavations of slave quarters on a plantation in Georgia have given us much information about how the slaves actually lived. We now know that slaves got much of their food by hunting or trapping wild animals, because many bones of opossum, rabbit, and fox were found in garbage piles at the site.

People who write histories about other people who don't write sometimes assume that the people who don't write are inferior. For example, the first explorers to study the large earthen mound sites along the Mississippi River thought that the Indians living there could not

possibly have built the mounds. They decided, without asking the Indians, that other, "more advanced" people built them. Even today, some people think that beings from outer space built the ancient ruins. Why? Because those people do not understand that prehistoric people had the knowledge, skills, and tools to build those structures.

Also, events and places, big and little, have simply been forgotten. Find a place in town where a building has been torn down and another put up. Do you remember what the first building looked like or what kind of building it was? How could you find out what the first building was if the records were incomplete or missing?

Written records may also tell the "ideal" version of events rather than what really happened. Different people have different ideas about the same event. You can see this yourself. With three or four friends, watch an "event" like a woodpecker flying, a rainstorm, or ants scurrying around an ant mound. Now, taking turns, and without interrupting one another, have each person describe that event. Did your "facts" agree completely? Human behavior is complex and flexible. We often do not really do what we say, or what we think we do, or follow the rules, whether they are written or not.

History is the study of the human past after there were written records. Prehistory is the study of the human past before writing was developed or brought into an area. People were around for a long time before they started to write. Humans who looked just like us were living in Europe and the Middle East about 40,000 years ago, yet the first written documents that have been found come from Sumeria in the Middle East, and are about 5,000 years old. This means that for most of the time that humans have been around, they wrote nothing down. Before people began to write, they started to grow domesticated crops like barley and wheat, and to herd domesticated animals like sheep and goats. They had also begun to live in big cities and to fight with their neighbors.

SUBFIELDS OF ARCHAEOLOGY

Archaeology is divided into different specialties based on the presence of written records.

Prehistoric archaeology is the study of past human cultures that had no written records. Although the Sumerians apparently developed writing about 3000 B.C. (5,000 years ago), other people did not begin to write until much later [Figure A.d.]. This means that the prehistoric period ends at different times in different places. In Sumeria, the prehistoric period ends and the historic period begins around 3,000 B.C. In Central and South America, the division between history and prehistory is difficult to draw. The Maya and the Aztec people both had hieroglyphic forms of writing. The Mayan system, which is older, began about 36 B.C. Archaeologists have only recently begun to decipher the Mayan records, and the Spanish destroyed most of the Aztec records for political reasons and because they thought that the records were the "words of the devil." Because of these problems, most scholars place the end of the prehistoric period and the beginning of the historic period to A.D. 1492, when Columbus brought European writing to the New World. From the evidence archaeologists have at present, it appears that no Indian people in North America (north of the present day Mexican border) ever developed a true writing system [Figure A.e.]. In the American Southwest, the prehistoric period ends sometime between A.D. 1540 (when Coronado's expedition took place) and 1700 (when missionaries, miners, and settlers made their way into the region).

Historical archaeology is the study of past human cultures that have written records. **Classical archaeology** is a kind of historical archaeology. Classical archaeologists study the ancient civilizations of Mesopotamia, Egypt, Greece, and Rome. All of these civilizations had writing and kept written records, but they flourished so long ago that many of the records are gone or are difficult to decipher.

Ethnohistory studies the past of people who did not write their own history, but whose history was written for them by others (like the southern plantation slaves).

WHY IS ARCHAEOLOGY IMPORTANT?

In answer to our earlier question, "Why study archaeology?," we can see many reasons why archaeology is important. Most people are curious about the past, whether it is the far distant past of mammoth hunters or the more recent past of our own lifetimes. For most of the human past, there are no written records because writing had not been developed. But before people developed writing, many very important events occurred, including the domestication of plants and animals, the beginning of large cities, and the start of large-scale warfare.

Even after writing was invented, many people still did not leave written records. Written histories contain many gaps and contradictory points of view. People often change information to suit their own purposes or they misinterpret events. Archaeology can sometimes reveal what really happened, instead of what people say or think happened.

We also study archaeology to learn how other people lived in different places and times. This broadens our perspective of the past and our understanding of different lifestyles and different customs. And, perhaps most importantly, archaeology is exciting and fun!

CLUES TO THE PAST

Whether they study the prehistoric or the historic period in the Americas, the classical civilizations of Greece or Rome, or the civilizations of China or Japan, all archaeologists are interested in reconstructing and explaining what happened in the past and how people lived. Archaeologists are like detectives. They must recreate the "scene of the crime" (reconstruct what happened) and figure out "who done it" (explain why the events happened or why people lived a certain way). Archaeologists use many different clues to study the past. These clues are the remains of material culture, and they may or may not be buried.

Archaeologists record, recover, and analyze the remains of **material culture** — all of the things that people made, used, or modified. Material culture consists of features and artifacts, which include structures, activity areas, plant and animal remains, pottery, chipped stone tools, and ground stone tools. These clues to the past [Figures A.f. and A.g.] may be found alone or they may be found together in a site. A site is any place where people have been and have left some evidence that they were there.

Artifacts include all of the things that people make, use, collect, or change. The artifacts that archaeologists study have been lost, thrown away, or purposefully put in a protected place, like a tomb. Artifacts may be thousands or even millions of years old, or they may be a few hours old. The cereal box that your mom threw out this morning and the tennis shoe that you lost last week are both artifacts!

Artifacts may be broken or whole and can include anything from pottery, to stone tools, to pieces of metal, to jewelry, clothing [Figure A.h.] or glass. Plant and animal remains are types of artifacts that require specialized analyses. Plant remains are often referred to as **floral** or **botanical remains** and animal remains are often called **faunal remains**. Human remains also are studied by archaeologists.

Features are places where some activity occurred. Features may be portable or non-portable. Hearths, roasting pits, borrow pits, and structures are non-portable features because they cannot be picked up as a whole and carried off. Hearths and roasting pits are places where people built fires to keep warm or to cook food. Borrow pits are places where people collected soil or clay to build or plaster a house or to make pottery. Structures include pit houses, pueblos, ball courts, platform mounds, ramadas, railroads, schools, and stores.

Portable features include things like concentrations of stone flakes where people made knives and scrapers or a pile of potsherds or glass from one broken pot or bottle. The individual pieces can be taken back to the lab for analysis. But what would happen if you picked up all of the flakes, sherds, glass fragments, and pottery and took them away without recording their original positions and relationship to one another? Then the concentrations of artifacts would no longer be a feature. So it is best to think of a feature as something that must be recorded in place as a whole in order to identify it.

PRINCIPLES OF ARCHAEOLOGY

Archaeologists often use the word "context." **Context** refers to where the remains of material culture are found and their relationship to each other and to the site as a whole. Understanding context is an absolutely essential part of archaeological research. When archaeologists map the artifacts and features at a site or write down descriptions of what they see, they are recording information about context. This information helps the archaeologist determine what the artifact or feature was used for and how it was used. Context is the way archaeologists date sites, determine how many groups of people lived at the site and where they came from, figure out what kinds of activities took place at the site (the site's **function**), and how and why the site was abandoned. Using information about context to figure out what happened at a site is a process called **interpretation.**

Archaeologists use two main principles to interpret material culture as it is found in context. The **Principle of Association** states that things found together were probably used together and are probably about the same age [Figure A.i.]. Therefore, if you find a tire beside the remains of an old car, the tire probably belonged to the car. But if you find a tire by itself in a wash and there is an old car in another wash a half mile or so away, the tire may not go to that car. As a matter of fact, they probably don't go together.

The second principle that archaeologists use to interpret material culture found in context is the **Principle of Superposition.** According to this principle, unless there has been disturbance, the artifacts on the lowest levels of a site must be older than the artifacts in the layers above them. The oldest layer is on the bottom and the youngest layer is on the top. [Figure A.i.].

Most of the artifacts that archaeologists study are things that broke and were thrown out. Today, our garbage is picked up and deposited in a landfill. The City of Tucson presently has two landfills that are huge piles of garbage. The garbage on the bottom of the landfills is older

than the garbage on the top. The landfill south of Tucson was first used in the 1960s. So the garbage at the bottom of that landfill — the first layer deposited — dates from the 1960s. The garbage on the top dates from today — the 1990s.

Like us, people in the past also tended to throw out their garbage in one area. Sometimes, prehistoric people put their garbage in a large pile, just like a modern landfill. Archaeologists call these piles **middens.** Another way that prehistoric people got rid of their garbage was by throwing it into abandoned houses or abandoned rooms. Unlike the landfill, archaeologists do not know exactly when middens or abandoned structures in a site began to be used as garbage dumps. But they can figure out relative dates of different layers of garbage using the Principle of Superposition.

Many of the sites that archaeologists study are partially or completely buried. Other sites are exposed and damaged by wind and water erosion. How did sites come to be buried or exposed, and how do artifacts come to be broken? There are many different ways that this happens; we call these ways **formation processes.** Formation processes are natural or human-caused (cultural) events that affect how an artifact or feature looks (its condition) and where it is located in a site [Figure A.j.]. If an artifact such as a mano or a pottery bowl broke while someone was using it, it usually would be thrown out. This is one kind of formation process. Another possible way for an artifact to break is if it fell from a roof or was burned and cracked in a fire. These are all cultural formation processes.

Things get buried or exposed in many different ways. Houses and ramadas collapse and then dirt blows over them. If the site is near a creek or river, it may be covered with mud during a flood. The ancient Roman site of Pompeii was buried by the ash of the volcano, Mt. Vesuvius. Sites in caves get buried because the cave walls and ceilings collapse and bury them. These are natural formation processes.

Sometimes, people intentionally buried things to hide them or protect them from animals. Also, people may have intentionally torn down old houses in order to build new homes on top of them. In Mesopotamia, people often built new towns on the remains of old towns. Some of these sites (called tells) consist of the ruins of 10 or more cities, all built on top of each other.

Formation processes are active at all sites, but different formation processes are active at each site. As part of reconstructing what happened at a site, archaeologists must identify what formation processes are present and how these processes have affected the artifacts and features at the site [Figure A.j.]. The effects of formation processes over time leave archaeologists with an incomplete picture of the past. Pieces of the "crime scene" are always missing. That is what makes archaeological detective work so challenging, and so exciting.

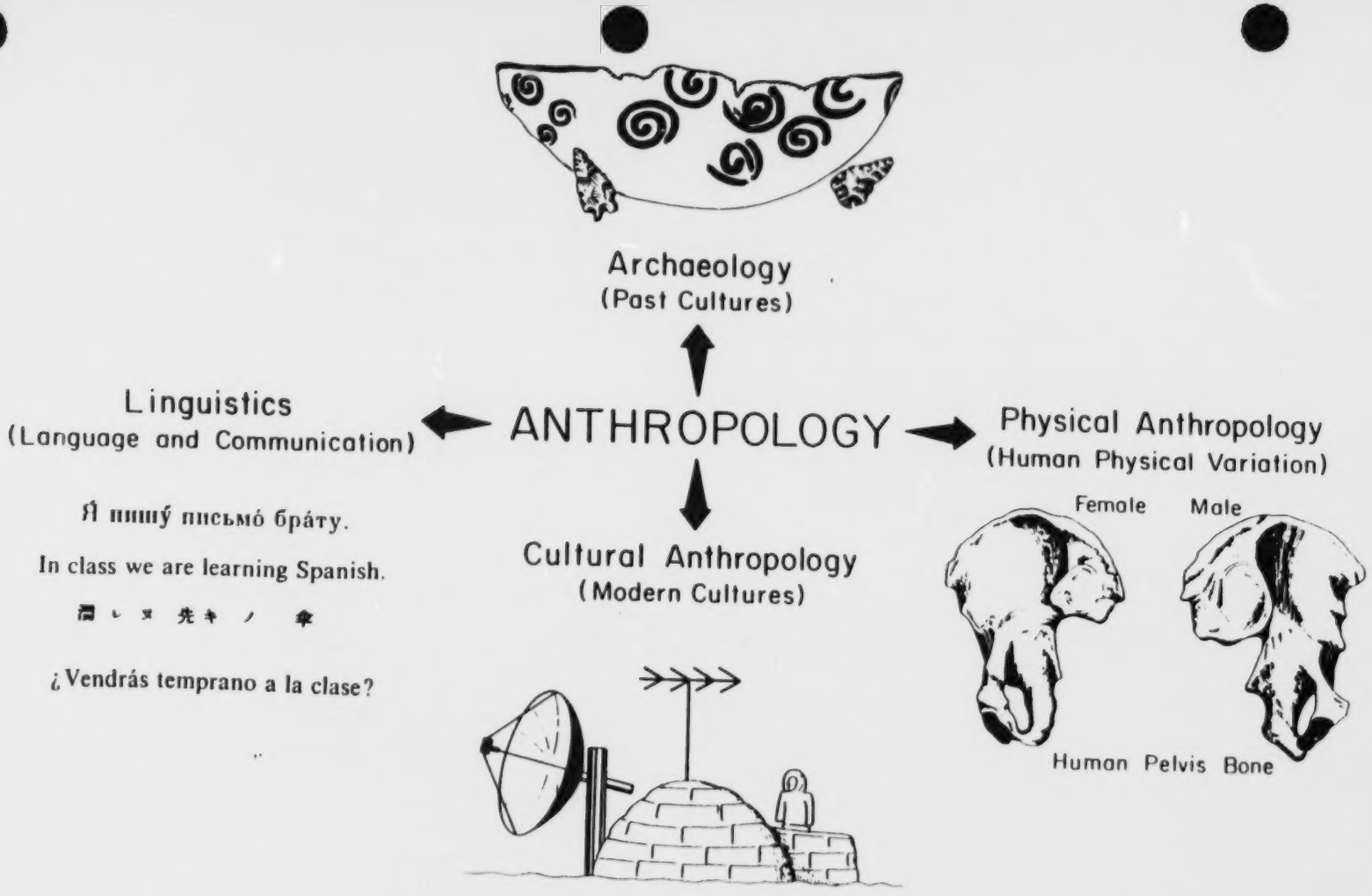


Figure A.a. The four fields of anthropology. Anthropology is the study of human culture. (Illustration by R. Beckwith.)

What modern native American culture is shown as an example of cultural anthropology? What four languages are shown as examples of linguistics?

A · THIEF OF · TIME

He's Stealing From You.

The remains of prehistoric and historic cultures belong to all of us. When artifacts are stolen and archaeological sites are destroyed, we lose important clues about the past, forever. Strict laws protect artifacts and sites on State, Federal, and Indian lands.

BE A STEWARD OF THE PAST

Report violations to your local law enforcement or land management agency.

(Arizona Governor Bruce Babbitt's Archaeology Advisory Group.)

Figure A.b. A thief of time. Pothunters and looters destroy hundreds of sites, and countless pieces of information about our past every year.

Can you tell what kind of prehistoric site the pothunter has been digging?

Figure A.c. Some of the animal designs that the Mimbres people used to decorate their bowls. The Mimbres people used this type of decoration from about AD 1000 to AD 1350. The Mimbres Culture is the name that archaeologists give to the prehistoric people who lived in southwestern New Mexico.

Can you identify the animals shown on the bowls?

MAYAN HIEROGLYPHICS

From A. P. Maudslay, *Biologia Centrali Americana, Archaeology, IV*

The portion of the Mayan inscription which is outlined may be translated "[On] 9.8.9.13.0 8 Ahau 13 Pop was born Mah Kina Pacal of Palenque. 12.9.8 after the birth, he acceded Mah Kina "Screech Owl" Pacal."
In relation to our Christian calender, the Mayan date 9.8.9.13.0 is AD 603. The Mayan date '12.9.8 after the birth' refers to the year AD 615, when 'Screech Owl' became king of the city of Palenque.

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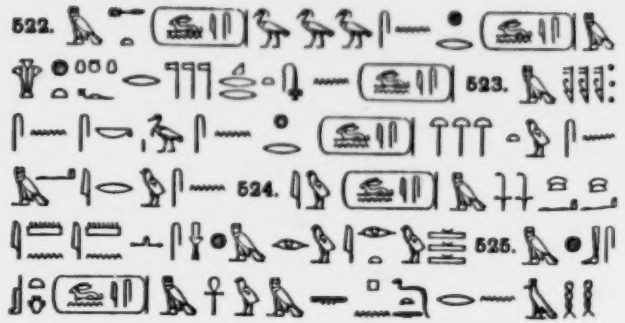
EGYPTIAN HIEROGLYPHICS



The above passage from the Book of the Dead translates: 522. "Unâs, and the offerings made unto him are more than those which are made unto the gods. The fire of Unâs 523. is in their bones, for their soul is with Unâs, and their shades are with those who belong unto them. 524. Unâs hath been with the two hidden(?) Kha(?) gods who are without power(?) .....525. : the seat of the heart of Unâs is among those who live upon this earth for ever and ever and ever."

Figure A.d. Two ancient writing systems: Mayan and Egyptian hieroglyphics. The Mayan people lived in the area of present day southern Mexico and Guatemala. They appear to have developed their system of writing by about 36 BC. The Egyptian writing system is earlier. It dates back to about 3100 BC. (Illustrations from Maya Ruins of Mexico in Color by W. M. Ferguson and J. Q. Royce and from The Book of the Dead by E.A.W. Budge.)

Since the historic period begins when people start to write, when does the historic period begin in Egypt? When does the historic period begin in the Mayan area? Is t[illegible]ic period older in Egypt or in Guatemala?

Figure A.e. Anasazi petroglyphs. No prehistoric Indians north of present-day Mexico seem to have developed writing. Instead, archaeologists think that they used petroglyphs and pictographs to record ideas or events. With writing, the written characters (like our alphabet) stand for sounds in a language. By stringing letters of the alphabet together, we also string together sounds to make a word. The written word stands for the spoken word. With petroglyphs or pictographs, the pictures don't seem to stand for sounds in a language. Instead, the pictures seem to represent ideas (the pictures of the sun and snake at the top of the panel might stand for a long journey, time passing, or an Anasazi clan) or an event (the three figures in the lower part of the panel might represent a ceremonial dance). Petroglyphs are very difficult to study because the drawings may have many meanings. If you had never been to a McDonald's restaurant, would you know what the "Golden Arches" meant?
(Illustration from Archaeological Survey and Testing at Petrified Forest National Park by S.J. Wells.)

What do you think that the Anasazi petroglyphs mean?

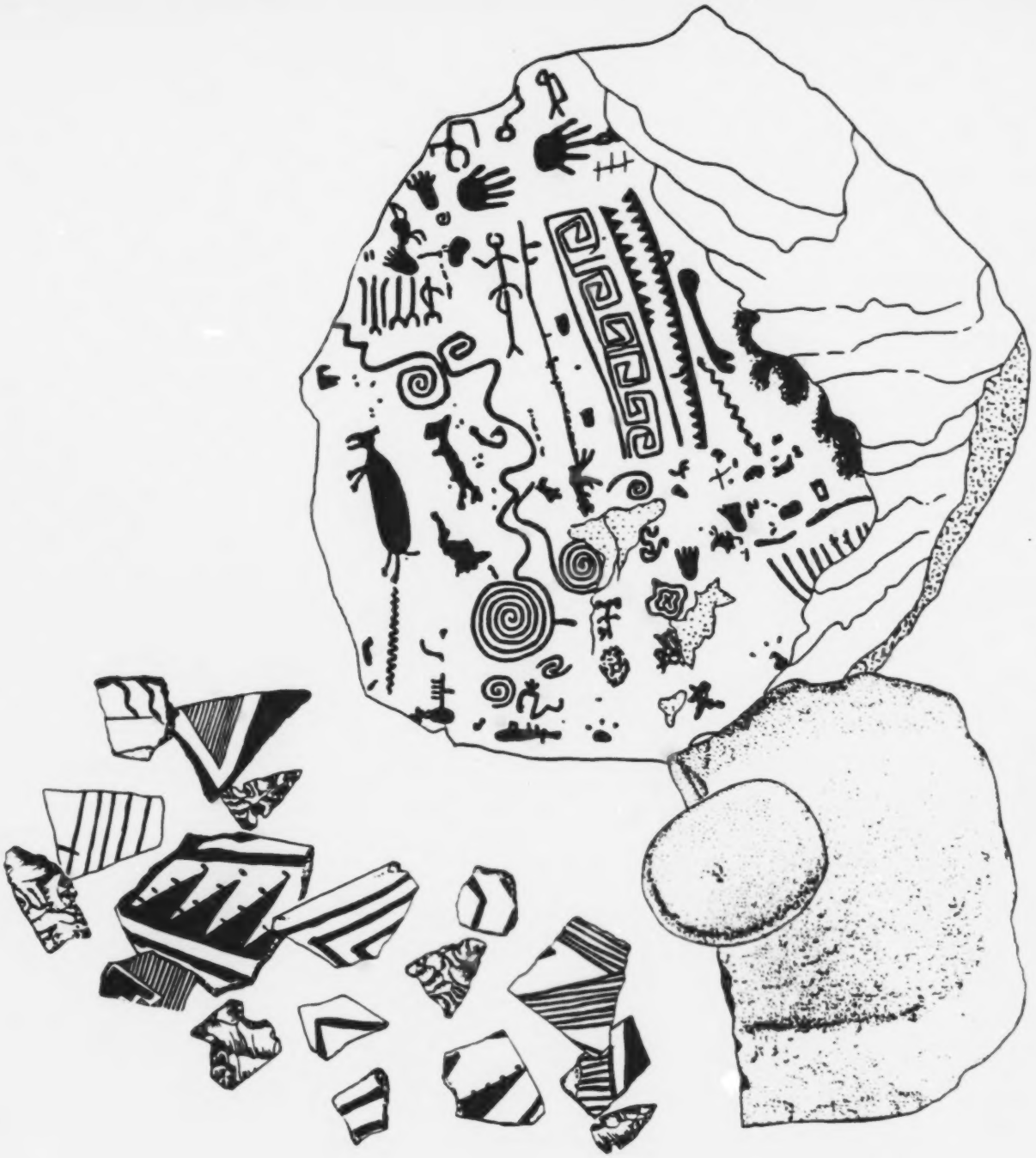


Figure A.f. Clues to Arizona's prehistoric past include (clockwise from top) a petroglyph panel, metate and mano, pottery sherds, and projectile points.

Which type of artifact is most numerous?

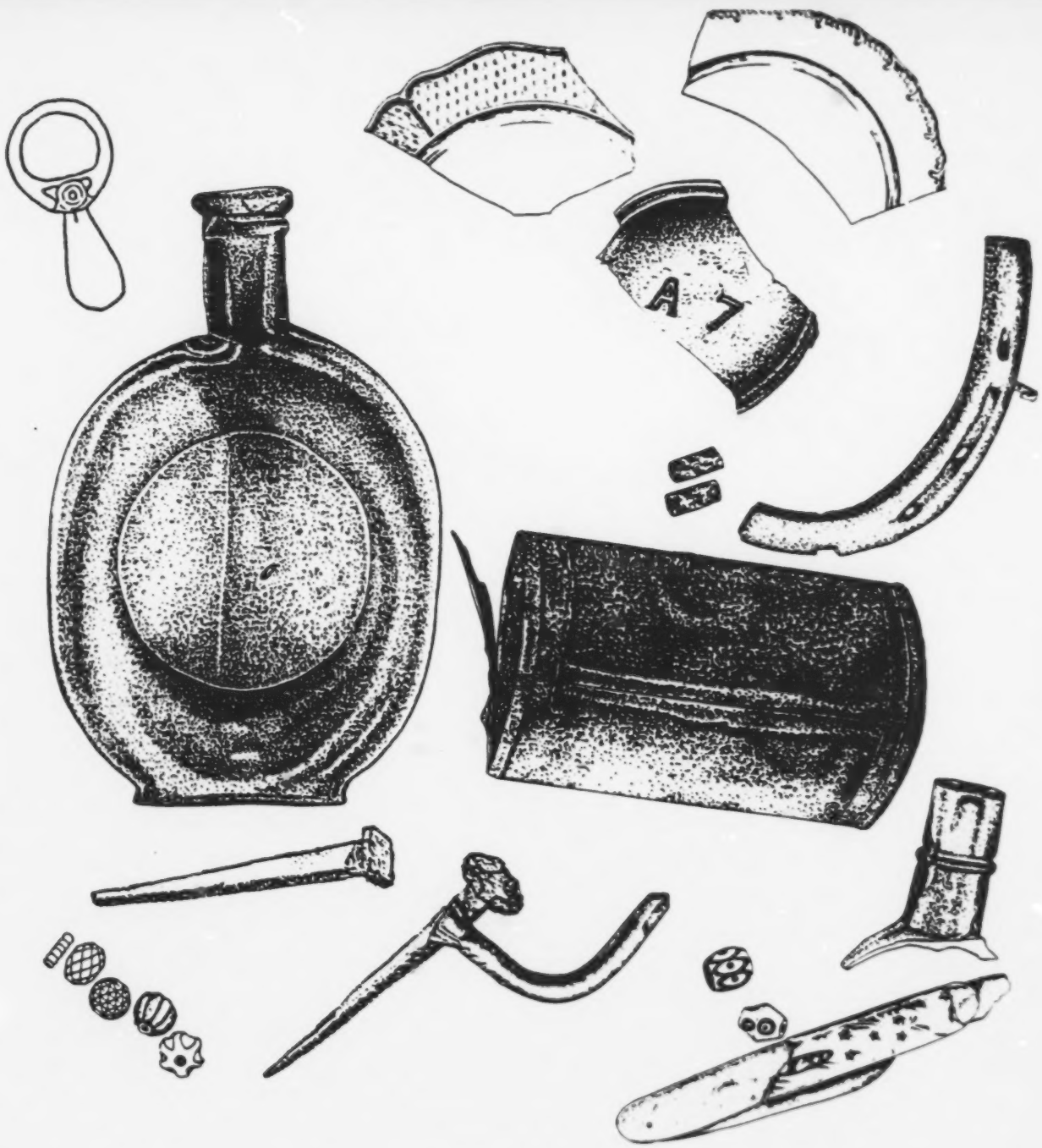


Figure A.g. Clues to Arizona's historic past include glass whiskey and beer bottles, decorated glazed white earthenware plates, pocket knives, glass beads, horseshoes, tin cans, nails, and aluminum pop tops from soda cans.

Can you find these artifacts in the drawing?

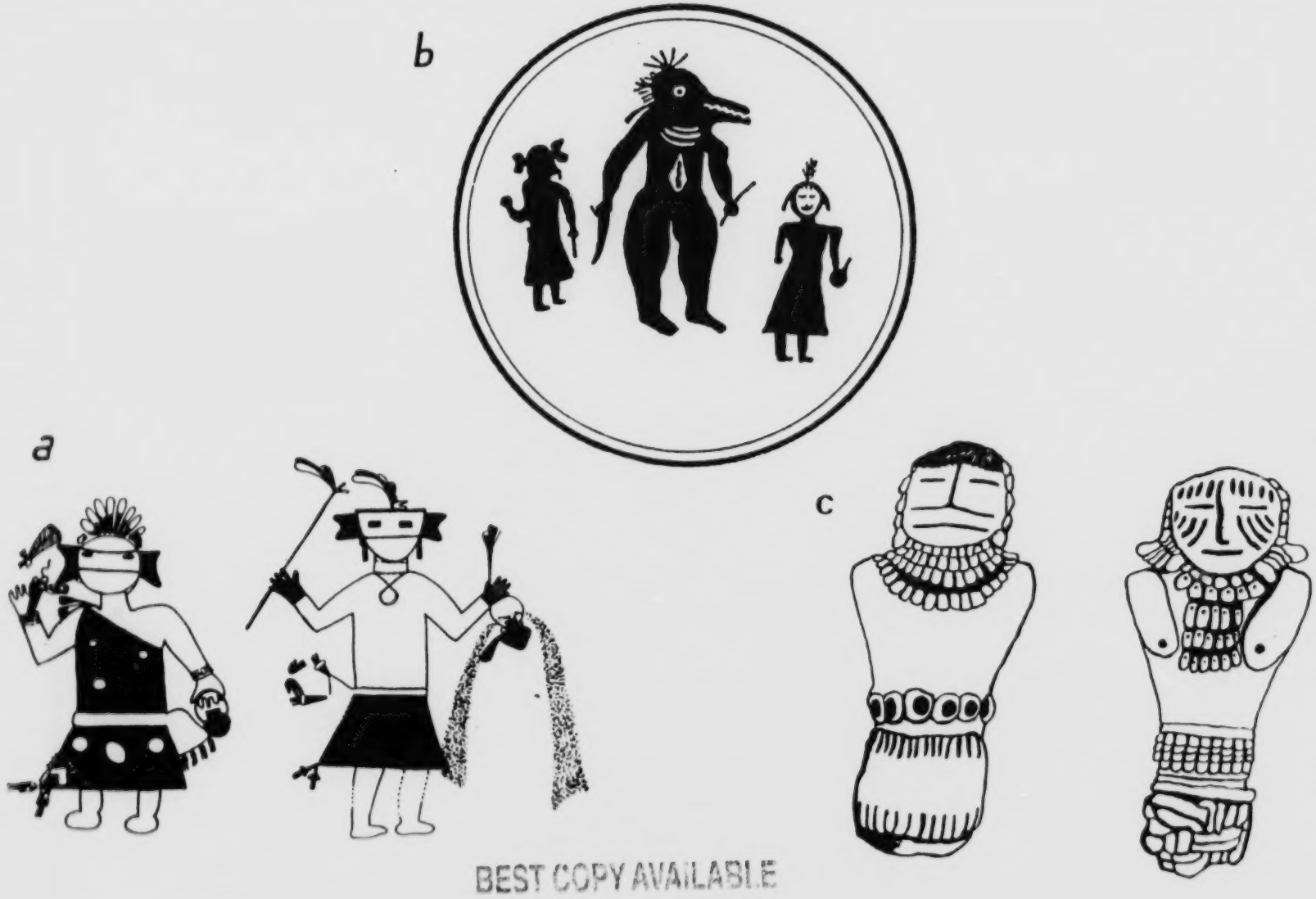


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Figure A.h. Clues to prehistoric clothing. Archaeologists rarely find remains of clothing on prehistoric sites. They must use other clues like paintings on stone walls (a), the designs on pottery vessels (b), or the molding on pottery figurines (c) to determine what kind of clothes and jewelry the prehistoric people may have worn.

Why don't archaeologists find remains of prehistoric clothing very often? What do you think the clothing and jewelry shown in the illustration was made of?

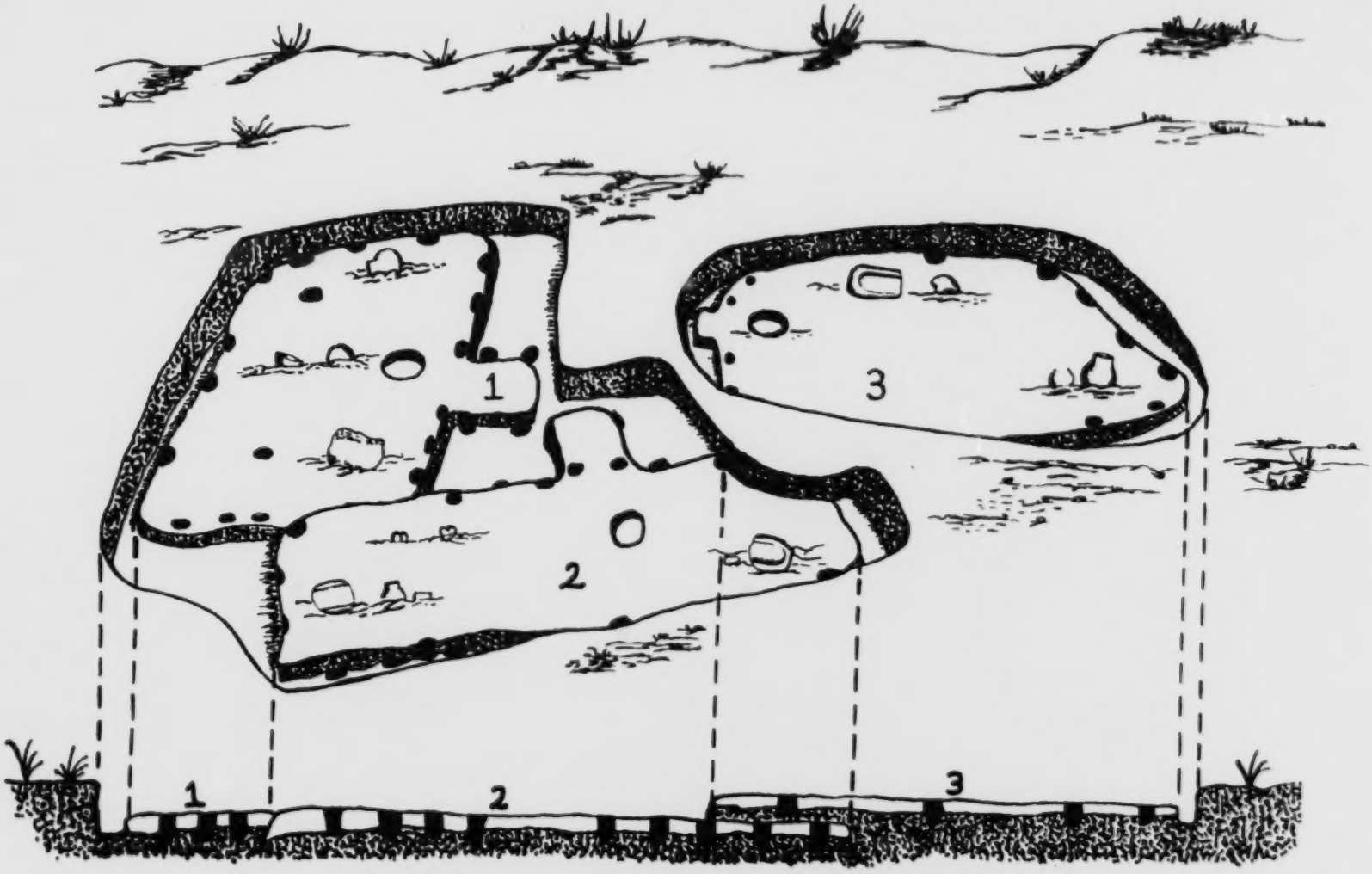

Figure A.i. The principles of superposition and association. The profile at the bottom of the page shows that a corner of Pit house 1 was destroyed when Pit house 2 was built. Part of Pit house 3 was built on top of Pit house 2.

Which pit house was built first? Which pit house is the youngest? What artifacts are associated with Pit house 1? Are these artifacts younger or older than the aritfacts associated with Pit house 3?

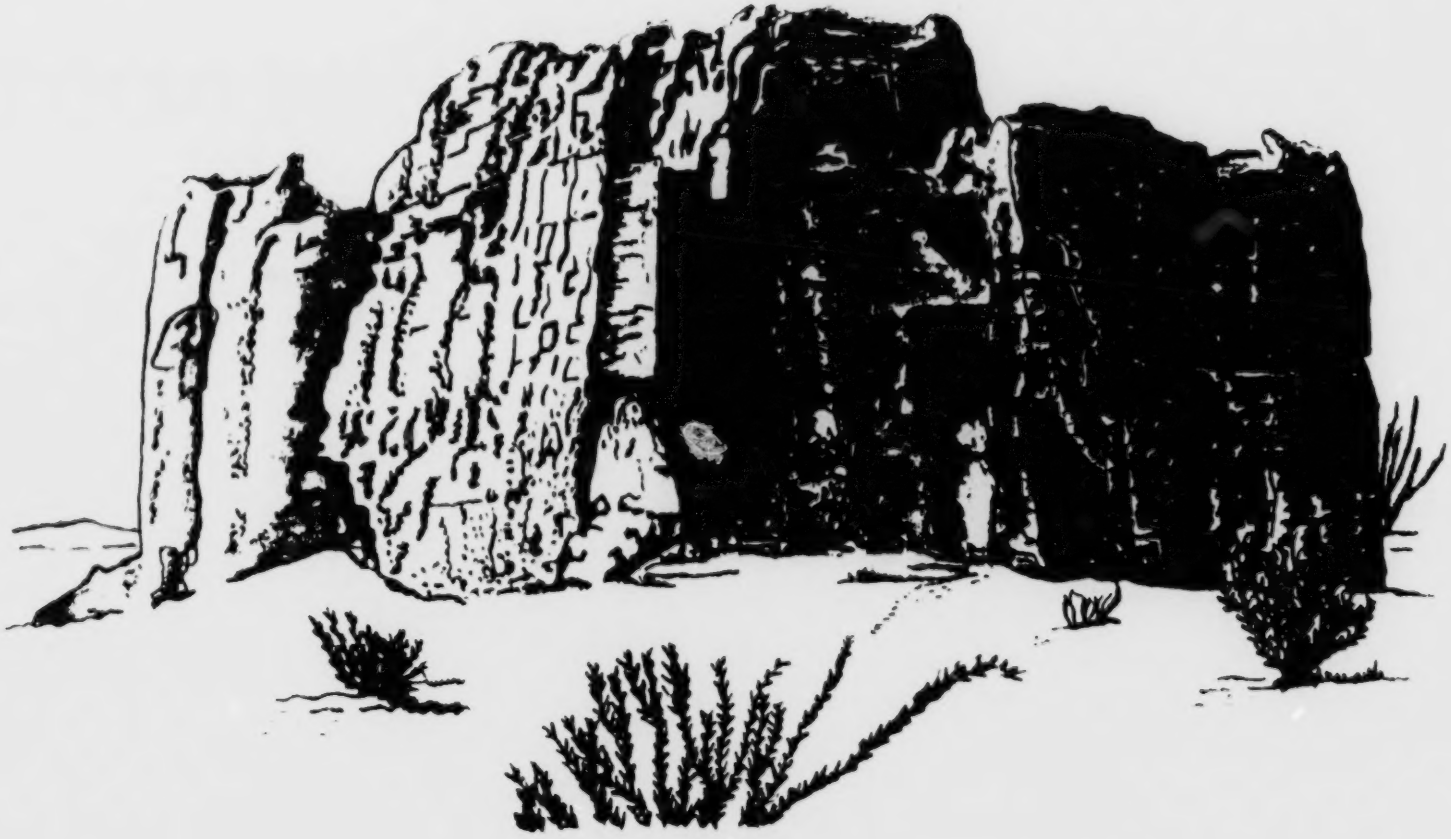

Figure A.j. The ruins of the Great House at Casa Grande Ruins National Monument in Arizona. The Great House is made of rammed earth or adobe. Once abandoned, adobe structures begin to deteriorate. The way that the structures and features at a site deteriorate affect what the archaeologist sees.

What formation processes (natural and cultural events) do you think have affected the Great House at Casa Grande?

SECTION B

DOING ARCHAEOLOGY

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Archaeological research is a systematic, multi-step process involving surveying and recording (finding and documenting sites), excavating (digging sites), identifying and analyzing (examining the artifacts recovered and the information recorded), interpreting (applying information recovered to answering research questions), curating (preserving, labelling, and storing artifacts and other records for future study), and writing reports (making the results of your work accessible to other archaeologists and to the public) [Figure B.a]. Actual time spent in the field surveying, recording, and excavating sites is very small compared to time spent in the laboratory analyzing the artifacts and other information recorded and writing the report. On many projects, archaeologists spend five or more days of lab work and report preparation for every day spent in the field. A project with 10 days (two weeks) of excavation could take at least 50 days (10 weeks or 2.5 months) for data analysis and write-up.

SURVEY AND RECORDING SITES

Finding Sites

When most people hear the word "survey," they think of engineers standing in the middle of traffic, using instruments like transits and theodolites to plan or realign a roadway. Archaeological survey is quite different, although transits and theodolites are also used. Archaeologists do surveys in order to find sites. Archaeological survey involves carefully walking back and forth across a specific piece of land, looking for artifacts and features that indicate that people were in the area sometime in the past.

There are many reasons archaeologists do surveys. Federal agencies that manage large areas of land, like the National Park Service and the U.S. Forest Service, first have to know how many sites and what kind of sites are in their area before they can make decisions about how best to manage and protect those sites. When large structures such as highways, power lines, or dams are built, archaeologists do surveys to find out how many sites could be damaged or destroyed by the construction. For example, before the Central Arizona Project canal between the Colorado River and Tucson was built, archaeologists surveyed the route and found over a thousand sites in the canal's path. Because the sites were found before the canal was built, they could be excavated and the information about past activities in the area saved.

Archaeologists also survey areas because they are trying to solve a problem or answer a question. If archaeologists want to know what methods Hohokam farmers used to grow crops on hillsides, they would survey hills, looking for and recording farming terraces, field houses, rock piles, check dams, and other agricultural features along with any other sites they might see.

Before a survey begins, the area to be surveyed is drawn on a topographic map or on an aerial photograph [Figure B.b]. Depending on how large the area is, the survey may be done by one archaeologist or by several archaeologists working as a team. When a team of archaeologists is surveying, each member keeps a fixed distance apart (for example, 10 or 20 meters) from the other team members so they know exactly how wide their path is. The archaeologists carry compasses to tell exactly in which direction they are walking. In order to know how far they have walked, the archaeologists might count their paces or footsteps, or they keep track of the area on the map or aerial photograph. By using these methods, archaeologists know exactly where and how much of the area they have covered. The amount of area surveyed each day is recorded on the map or aerial photographs.

Recording Sites

In general, archaeologists record two kinds of things during survey. Individual artifacts, like one lone potsherd or a projectile point, or a small number of related artifacts, like a group of sherds from a broken pot, are recorded as **isolated finds**. Isolated finds are sites where people have been for only a short time, or where they have left only one or two things. Usually, the only information recorded for isolated finds is their location and the kind of artifact found. Several different kinds of artifacts occurring together (like a scatter of sherds and lithics), or a group of features (like roasting pits, hearths, and the remains of houses or other structures,) are recorded as sites. Features found by themselves, such as a single house, may also be considered a site.

Archaeologists find many different kinds of sites during survey. Some village sites are so big that they stretch for miles. A large village may include many features or activity areas, such as the outline of pit houses or a group of stone flakes left over from making knives and scrapers. Mounds covered with many different kinds of artifacts often show where people threw out their garbage. Rockshelters, stone tool quarries, rock art panels, and farming sites are other types of sites that may be found.

What about historic sites? Remember, archaeologists study the more recent past as well as the prehistoric period. The run-down buildings and other structures on old ranches and farms are examples of historic sites that may be found. Sometimes, archaeologists even come upon the remains of entire mining towns that have been abandoned for many years. Other examples of historic sites include old railroad beds, can and bottle dumps, and camping areas. Archaeologists never know what they might come upon during survey. One archaeologist found the remains of a train wreck that occurred in the 1920's.

When a site is found, the archaeologists record various kinds of information. The site's location is plotted on a topographic map or an aerial photograph and detailed information about the artifacts and features, the site's environment, distance to water, topography of the land, and the site's size are written on official survey forms. If they can figure it out by looking at the artifacts and features present, archaeologists also record when they think the site was occupied. Photographs are taken and a site map is made, using a compass or transit. Sometimes samples of artifacts are collected and taken back to the lab for analysis.

After the survey is finished, all of the information about the isolated finds and sites that were found is put into permanent files that are kept by agencies such as the Arizona State Museum, the National Park Service, and the U.S. Forest Service. These files are kept so that archaeologists doing other studies or surveys in an area can see what kinds of artifacts and sites were previously found.

Doing archaeological surveys can be very difficult. In very hot or very cold weather or when it is raining or dust is blowing, sites and isolated finds can be almost impossible to find. Even large sites may be missed. So, one area may be surveyed several times.

Another reason for keeping permanent records is so that sites can be found again by other archaeologists. For this reason it is very important to record site locations and other information carefully. The more detailed the information that is available about a site, the easier it is to find again.

The agencies that keep site files do not, however, give information about the location of sites to just anyone who asks. If they did, the amount of pothunting would greatly increase. Only professionals, such as archaeologists, planners, or resource managers, who have an official, legitimate need to know about the archaeological sites in an area are given information about site locations.

Besides putting the survey information into permanent files, the archaeologist also writes a report that tells how the survey was done, where it was done, what was found, and what the information tells us about the past activities and events in the surveyed area. The important thing about doing surveys is that they give archaeologists a regional perspective. When archaeologists excavate a site, they get a lot of detailed information about that particular site, but very little information about the site's "neighborhood." They could continue excavating to get information about other sites in the area, but this is expensive, time consuming, and often impossible. Doing archaeological survey is the best way to find out about all of the different sites in an area because survey gives us a little information about a lot of sites.

Remote Sensing and Other Information

Doing survey is not the only way archaeologists find sites. More and more archaeologists rely on information from remote sensing instruments, such photographs from Landsat satellites.

Survey is good for finding artifacts and sites that are above ground, but what if the site is buried and you cannot or do not want to excavate? To find buried sites without excavating them, archaeologists use instruments like ground-penetrating radar and magnetometers. Both of these instruments locate sites by detecting changes in radar or magnetic signals that penetrate the ground surface and then bounce back. If they hit something other than rock or soil, the signal is different. In Great Britain, archaeologists found buried sections of a road built by the Romans around the time of Christ by using ground-penetrating radar.

Besides doing survey and using remote sensing instruments, archaeologists also find sites by looking at old documents in library archives and by talking to people. Maps made by the early settlers in an area may show the locations of prehistoric and historic sites. And people who have lived in an area for a long time often know where sites are located and are willing to share their information. Another important way that archaeologists find out about sites is by hikers and campers reporting them. So if you are out exploring, hiking, or camping and you find artifacts or a site, be sure and report it to the Arizona State Museum. The site that you report could provide many clues that will help to unravel the mystery of Arizona's past!

EXCAVATION

Which Site to Dig

How do archaeologists select a particular site to dig? That depends on the reasons for excavation. An archaeologist may look for a site that matches a particular research interest. For example, someone interested in the Paleo-Indian period may select a site with mammoth or extinct bison bones, while one who is interested in late nineteenth-century history may select an old mining camp or a trash dump full of broken bottles and rusty cans. Before the 1960s, most archaeologists excavated sites based on their own interests.

Beginning in the late 1960s, state and federal laws were passed that require people to look for archaeological sites before they make any changes to federal, state, county, or city land. For example, before the Bureau of Reclamation started the Central Arizona Project, archaeologists were hired to look for sites where the canals and other structures would be built. Many sites were found. Then archaeologists were contracted to excavate, analyze, interpret, and report on a sample of those sites.

They selected the sites to excavate after developing **research designs**, which are written plans to guide work. These plans include research questions and the steps needed to answer those questions. Archaeologists rarely dig an entire site, because they have limited funds and time. The research design helps them decide what parts of a site to dig. Archaeologists today seldom excavate anything without developing a research design or plan of work beforehand. They are very careful when developing the research design, because once a site is excavated it is destroyed.

In the research design, archaeologists develop questions that might be answered through excavation. For example: How did the people at the site build their houses? Did the people have contact with other cultures? How long was the site occupied?

Archaeologists often use **"hypothesis testing"** to guide their research. In hypothesis testing, a statement is made that can be tested when certain types of artifacts and information are found. For example, the question "What kind of crops were grown at a site?" would be stated as the hypothesis "If corn were grown at this site, then I would expect to find corn pollen, digging sticks, and grinding tools to turn the corn into flour." If corn pollen, digging sticks, and grinding tools are found, then the archaeologists can conclude that corn was grown at the site. Usually, more than one hypothesis is developed in a research design, because most sites contain enough information to answer many different questions about the past.

Records, Records, Records

Archaeologists have to be good observers. Much of what they know about a site comes from carefully watching as they dig. But archaeologists cannot simply observe; they must write their observations down. The most important tools archaeologists use at a site are **graph paper, notebooks, and pencils or pens. Cameras** are important, too, but only if the photographer remembers to write down information on what was photographed. Only by making written records can archaeologists save and interpret the information they find.

Why? Because once an artifact is moved from its place in the dirt, it can never be put back exactly where it was found, unless someone remembered to record where the artifact came from. And information about features, things such as houses, hearths, and middens that cannot be picked up and moved, must be recorded on paper and with photographs, because they will be destroyed in the process of digging. If good records are not kept as a site is excavated, the information that the site can give us about the past is lost forever.

Grids

One way archaeologists make it easier to record where things came from on a site is to use **grids** to divide the site into squares. Setting up grids is sort of like laying a large, imaginary sheet of graph paper down over the site [Figure B.c]. Each square is assigned special numbers or letters that are different from every other square. That way, when an artifact is found and put into a bag with a special number on it, the archaeologists will always know that the artifact came from that particular square. One term for the specific location of an artifact is **provenience.**

When the artifacts are studied in the laboratory, the archaeologists will know, for example, that 10 pieces of red pottery came from one place on the site and a broken projectile point and chips of stone came from another place. That tells the archaeologist that people were doing different things in different areas. The place where the pottery was found may have been a storage or cooking area. And the place with the projectile point and chips of stone may have been where someone tried to make a projectile point, but failed.

Grid squares help archaeologists to understand how people used the space within a site. Features are put on a map that is based on the squares. Middens usually are found at the edge of a living area, not in the center of it. Houses are arranged in relation to one another, sometimes with doorways facing out into an open work area. Cooking and pottery-making fires are kept away from houses, and so on.

Depth

Besides using the grid to keep track of where things are horizontally on a site, archaeologists record where things are found vertically by measuring their depth from an imaginary point just above the surface of the ground. This imaginary point is called the **datum**, and a measurement taken from it is called **depth below datum.**

One way to measure depth below datum is with a tool called a **line level.** (Line levels are used by carpenters and bricklayers to help them build straight, level walls.) Archaeologists attach a piece of string to a rod or stake that has been pounded into the ground. The point where they tie the string becomes the datum. Once the string is attached to the rod or stake, it should never be moved, because moving it would change the datum (the imaginary point in space). The string is then stretched over the part of the site the archaeologist wants to measure — let's say to the floor of a pit house — and the line level is attached to the string [Figure B.d]. The archaeologist looks at the line level to determine when the string is level with the datum. Then the archaeologist uses a **tape measure** or **meter stick** to measure from the string to the floor of the pit house. The archaeologist then knows that the pit house floor is so many centimeters below datum.

Why is that important to know? Because the depth in relation to other features or artifacts will tell the archaeologist whether the artifact is older or younger than another artifact or feature. Artifacts on the bottom are usually older than artifacts on the top of a site. This is the Principle of Superposition. The position of one layer in relation to another is called **stratigraphy**. When archaeologists dig, they find the most recent layer first, and the oldest layer last.

To control how deep they are digging, archaeologists dig in two kinds of **levels**, arbitrary and natural. Arbitrary levels are determined by the archaeologists, and are often used at the beginning of an excavation because the natural levels are unknown. For example, an archaeologist might decide to dig in 5-centimeter levels. If the ground surface is 5 centimeters below datum, then the first level, from the ground's surface down, would measure from 5 to 10 centimeters below datum. (Remember that the datum is an imaginary point in space, so the actual surface of the ground is below that). The excavators start at 5 centimeters below datum and finish at 10 centimeters below datum, digging into the ground for a total depth of 5 centimeters. By digging in these controlled, arbitrary levels, even if archaeologists never find a feature or visible layers of soil in the ground to guide them, they will still know which materials were on the top (and are probably the youngest) and which materials were on the bottom (and are probably the oldest).

Natural levels are layers in the dirt that are visible remains of an activity or even that happened at the site. Layers of burned earth or mud, ashes from a fire, windblown sand, and the remains of a fallen wall are all examples of natural levels. If the archaeologists find a feature like a house or a pit, they will dig that separately, making depth measurements at the top and bottom of the feature, and collecting and bagging all materials separately as part of that natural level. All of the information about the natural level is recorded separately from the information about the rest of the grid.

Digging, Observing, and Recording

Once archaeologists have mapped the surface of the site and recorded depths from the datum to the surface of the ground, they are ready to dig. While digging, archaeologists use many different tools, ranging in size from backhoes to dental picks. Backhoes are machines with large scoops (called buckets) on one end that might be used to quickly dig a trench in order to see the stratigraphy at a site, or to uncover features and artifacts that are buried deep in the earth. Dental picks might be used in cleaning the dirt from around a pot or a fragment of bone.

The most common tools used at a site are trowels, whisk brooms, paint brushes, shovels, buckets, wheelbarrows, screens, paper and plastic bags, clipboards, graph paper, notebooks, pencils, and measuring equipment.

Shovels are used to move dirt quickly from a grid into a bucket. Then the dirt is carried to a **screen** — a wooden frame with wire screening in the bottom of it that is sometimes set on legs or on a stand of some type. The dirt is put in the screen and the screen is shaken. Artifacts remain in the screen and the dirt falls through, leaving a pile that archaeologists call **backdirt**. The screens are set up over places on the site that have already been dug or places that will not be dug, because archaeologists do not like moving the backdirt from place to place. Another way to quickly move dirt is to place a screen over a wheelbarrow and shovel into the screen.

Besides recovering artifacts in a screen, archaeologists record artifacts that are left in place in the ground. Artifacts that have not been moved out of their original positions are said to be **in situ**. The kinds of artifacts recorded in situ are metates and manos, whole pots, stone axes, and human and animal skeletons. All artifacts found on the floor of a house or the surface of an outdoor work area or **plaza** are also recorded in situ. In this way, archaeologists can identify where activities took place.

As archaeologists dig with shovels they listen carefully for changes in the sounds their shovels make as they hit the ground and for changes in the way the dirt feels as the shovels go into it. They also watch for changes in the color and texture of the dirt they are removing. Those changes can signal the presence of a feature or artifact. It is fairly simple to find a metate this way because the shovel clangs and won't go any farther into the ground. But the outline of a pit house is often hard to detect. There may be a slight change in the color of the dirt and the shovel may go in easier or harder, depending on what part of the house has been found. A change in sound or in the way the ground feels to the excavator might be the only clues an archaeologist has to go on. Here is where careful observation becomes important. It is very easy not to pay attention to those small clues and dig right through a house or other feature!

Once a feature or artifact is located, archaeologists usually switch from shovels to trowels, whisk brooms, and paint brushes. The flat, straight edges of a **trowel** make it easy for the archaeologist to scrape down to a certain level, and the pointed end can be used to probe carefully around an artifact or feature. **Whisk brooms** are used with trowels to uncover a feature, layer, or artifact. Usually it is easier to see a feature in dry ground if it has been brushed — cleaned in the same way you would sweep off a porch or a carport floor. In fact, archaeologists clean the floor of an entire pit house by using brooms to sweep away thin layers of dust and dirt. **Paint brushes** are for cleaning away dust, usually from an artifact such as a pot, and for excavating around delicate objects such as bone.

After finding and defining the outlines of a feature or artifact, archaeologists stop to take notes, to measure the depth below datum of the feature or artifact, and to measure in the location of the artifact or feature and place that information on the map of their grid. They may take a photograph. Then, if the bottom of an artifact has been found, they may remove the artifact, or they may decide to leave it in situ to see if it is associated with anything else, like a house floor, a roasting pit, or other artifacts.

After recording the outline of a feature, archaeologists will label new, empty bags with the number of the feature (and other information), and begin to excavate the feature, being very careful to keep the dirt and artifacts from the inside and the outside of the feature separate.

Inside a feature, there may be more than one level to dig [Figure B.e]. For example, as a pit house falls apart, things happen to it that affect what can be found inside. The walls and roof collapse, covering any artifacts left inside. As months go by, dust is blown over the remains of the roof. People living nearby may use the area as a trash dump, creating another layer of material. Archaeologists must observe carefully to find these changes. As a precaution they may dig in arbitrary levels to see if there are differences among the top, middle, and bottom layers of a feature. Arbitrary levels are depths — 5 cm., 10 cm., 20 cm. — that are set ahead of time. They allow the archaeologists to control information on where artifacts come from in a site.

Artifacts

The artifacts found in screens and recorded in situ are separated by the type of artifact — pottery, bone, charcoal, chipped stone. Then the artifacts are put in **bags** that have been labeled with the site number or name, the grid number, the level or feature being excavated, the date the artifacts were dug up, the names of the excavators, and the type of material in the bag. [Figure B.f].

Why is all this information important? On a dig, materials are often not washed and sorted until weeks after they were excavated. Also, the people digging are not always the people working in the laboratory, so the lab people need as much information as they can get before they start washing and sorting the material.

The site number or name is a way of distinguishing one particular site from another. There are thousands of sites in Arizona, and material from many excavations may be stored in one room of a museum. Imagine if artifacts from the sites were not labeled with a site number. Once they were put on shelves, no one would be able to figure out which artifact came from which site. Also, archaeologists often compare artifacts from one site with those from another, so they need to know what sites they are comparing and where those sites are located.

The grid number and level or feature number — called the provenience information — tell the archaeologists where the material came from in the site. That will help them reconstruct what people did at the site.

The date of excavation and the names of the excavators are important because the laboratory people may have questions about the material found in the bags or the provenience information written on the bag. If they know the date of excavation they can tell where the excavators were supposed to be on the site, and if they know the names, they can ask those people to try to remember what they found and where.

The type of material is important to know, because different materials are cleaned and stored in different ways. Pottery and stone tools can usually be washed in water without destroying them, but if charcoal were washed it would fall apart. Charcoal should never be washed. Bone is cleaned by carefully brushing off the dirt, but it may need to be put in a special place for storage so it won't fall apart. Some materials may be handled in special ways. Examples of these special materials include dirt from the inside of a jar that may contain seeds or pollen, and charcoal samples that can be used for radiocarbon dating or for tree-ring dating.

The End of a Dig

What happens after archaeologists have recovered all the information they can from a site? If the site was excavated as part of a contract project, the rest of the site may be destroyed by construction — of a highway, for instance. Or part of it may be set aside to be preserved for future work. If the site was excavated as a research project, the unexcavated parts may be preserved and they may even be interpreted for the public. In Arizona, there are several sites preserved in this way, such as Casa Grande National Monument, Tubac State Historic Park, Wupatki National Monument, Pueblo Grande in Phoenix, and the historic and prehistoric parts of Fort Lowell Park in Tucson. Many sites in a specific area may be preserved as a group, like the sites in Saguaro National Monument. Archaeologists constantly develop new techniques of excavation and analysis, as well as new ideas about what happened in the past. By saving sites, archaeologists will always have a sample on which to test their techniques and ideas.

Cleaning, Labeling, and Sorting

So, the site itself has been completely destroyed or part has been preserved for future work. What happens to the artifacts and the information that the archaeologists have recorded about the site? First, the artifacts are cleaned, labeled, and sorted. The notes and maps are studied, and the archaeologists begin the task of analyzing the information.

When the artifact bags arrive in the laboratory, they are sorted by material type. The bags with sherds and lithics are set in one place for washing. Those with bone are set in another for cleaning. Charcoal fragments and dirt samples are boxed up for shipment to specialists, and so on. Archaeologists working in the laboratory must be very careful to keep all of the provenience information with the artifacts and other materials during the sorting and cleaning stage, so that information is not lost.

Artifacts such as pottery, chipped stone, and bone are labeled with provenience information, so that archaeologists can easily compare material from different locations while still knowing from where a particular piece of pottery or a projectile point came.

Then the archaeologists start sorting the artifacts. Certain types of pottery are piled in one place, pieces of chipped stone go in another, stone tools in another, manos and metates in another. The archaeologists make an inventory — a list — of the material as they sort it. One provenience may contain 30 pieces of red-on-brown pottery, 5 pieces of undecorated pottery, 6 pieces of chipped stone, a scraper, and 3 manos. Potsherds from the same vessel are grouped together, as are fragments from one broken metate.

ANALYSIS

Once sorting is finished, archaeologists and various specialists can begin analyzing the artifacts. What they look for depends on the research design. Analysis usually involves the efforts of many specialists.

Dirt from inside a jar may be divided, with some being sent to an **ethnobiologist** and some to a **palynologist**. The ethnobiologist will separate from the dirt the tiny fragments of seeds, bone, and insect parts that are in it. Often this is done through a process called **flotation**, where the dirt is put into water. As the lighter materials — seeds, insect parts, bits of charcoal — float to the top they are scooped off with a net and collected. The heavier material is then put through a sieve and the remaining non-dirt materials — bone, some seeds — are collected. With these bits of information, the ethnobiologist may be able to tell what was stored in the jar and what insects and rodents got into the jar after it was stored.

The palynologist uses a series of chemical baths to separate the dirt from grains of pollen. By studying the pollen through a microscope, the palynologist can tell the archaeologist what may have been stored in the jar, and what kinds of plants were around the site in the past [Figure B.g].

Charcoal samples may be sent to a **radiocarbon dating laboratory** or to the **Tree-Ring Laboratory** at the University of Arizona for analysis. These samples will allow the archaeologists to date the site. The tree-ring analyst can also tell the archaeologists which kind of tree or bush was burned to form the charcoal.

Bones are sent to two types of specialists. Human bones are sent to **human osteologists** for analysis, and animal bones are sent to **zooarchaeologists**. The osteologist can determine the age and sometimes the sex of the person whose bones are being studied, and may also be able to tell if the person had any diseases or broken bones. The zooarchaeologist will sort the animal bones into different types — deer, rabbit, turkey, hawk, snake — and may be able to tell if the animals were used by people at the site for food and clothing or if animals, like burrowing rodents, came into the site after it was abandoned.

While these special studies are going on, other archaeologists analyze the stone and ceramic artifacts. Because the task of analyzing material is usually too big for one person, archaeologists often specialize in the analysis of one type of artifact — a ceramicist studies pottery, a lithics expert studies chipped stone, shell experts analyze the shell artifacts, and so on. Chipped stone specialists study the edges of flakes to see if they were used as tools. Ground stone specialists use microscopes to study the grinding surfaces of metates and manos to see if they can figure out what was ground on them. Ceramicists look at the designs and the paint on decorated pottery to determine what group of people made the vessels and when they were made.

DATING THE SITE

How Old Is It?

One of the first things that archaeologists want to know is the age of the artifacts and things that they find. How old is the site? When did people first settle there and when was the site abandoned? Did people live there only once or did several groups of people move in and out at different times? Were different parts of the site occupied at different times? When was the hearth or roasting pit used? How old are the potsherds and projectile points?

Unfortunately, archaeologists cannot talk to the people who built and lived at a prehistoric site to find out about the site's age. And the prehistoric Indians of the Southwest left no written records that tell when sites were occupied. In order to date a site, archaeologists must first date the artifacts and features at the site. But again, archaeologists cannot ask the people who lived at the site when they used the hearths or made and used the artifacts. And there are no documentary records to provide this information.

Archaeology and Dating

So how do archaeologists date sites? There are several different dating techniques that archaeologists can use. These techniques fall into two categories: relative dating techniques and absolute dating techniques. You can probably guess what the difference is between these two groups of techniques. Relative dating techniques provide information about how old something is or when something happened relative to the age of other things or events. The statement, "this site is older than the site across the wash," is an example of a relative date. In contrast, absolute

dating techniques provide a calendar date, that is, a year or range of years. The statement, "this site was occupied from A.D. 1275 to A.D. 1300," is an example of an absolute date.

Relative Dating Techniques

Seriation, cross-dating, and stratigraphy are **relative dating techniques** that archaeologists often use to date an artifact, feature, or site. Using stratigraphy to date something is based on the Principle of Superposition. **Stratigraphy** is the accumulated layers, or **strata**, of soil and artifacts at a site. Different strata are made up of different artifacts and represent different processes or events. The Principle of Superposition states that as long as the strata are not disturbed, the stratum on the bottom was laid down first and is older than the strata above.

For example, an archaeologist excavating a Hohokam pit house finds four strata. The lowest stratigraphic layer is the pit house floor. On top of the floor is a layer of burned wooden posts, thatch, and packed earth. Over this stratum is a thick layer of caliche plaster. On top of the plaster is a dense layer of artifacts that includes ashes from hearths, animal bones, and corn cobs. This sequence of strata tells the story of the pit house. First, the pit house was built (indicated by the pit house floor) and occupied (indicated by the artifacts and features on the pit house floor). Then, the house burned down, and the area was used as a place to mix caliche plaster for use in building other houses (indicated by the thick caliche layer). Finally the depression left by the house was used as a garbage dump (indicated by the stratum of dense artifacts). The positions of the different strata indicate the order of the events in the pit house's "life."

The general rule of stratigraphy — old on the bottom, young on the top — does not always work. On sites such as Hohokam villages, where people lived in one place for a thousand years or more, areas were often used and reused through time. While digging pits for houses, the Hohokam often dug through older features such as trash pits. As they dug the new pits, they threw the older trash on top of their own refuse. Unless archaeologists are very observant, they might think the old trash is younger than the layer under it.

But if they are careful, archaeologists will be able to tell that the older trash was dug up and redeposited. How? The people who dug out the old trash pits probably did not remove all of the trash. And they laid the new house floors over the old trash, sealing that material below the new floors. If archaeologists think to dig below the house floors, to make sure they have all of the deposits from the site, they will find the older trash and realize that the stuff below the floors is really older than anything found on or above the floors.

Seriation is based on changes in the shape and decoration of artifacts and features. Just as clothing and housing styles change today, so did the styles of artifacts that were made during the prehistoric and historic periods. Certain artifact shapes and styles of decoration were made only for a certain length of time. In the Southwest, ceramic artifacts, especially bowls and jars, changed a lot over time. Archaeologists are able to recognize and assign relative dates to these changes because they have found similar sequences of potsherds in the same stratigraphic relationship at many sites. Archaeologists have found that in undisturbed areas, potsherds with certain kinds of decoration and shape always appear in the same order (that is, above or below) relative to potsherds with another kind of shape or decoration. The same situation is also true for features like houses, and for other artifacts like projectile points, metates, and manos, the styles of which also change in shape and in size through time.

By knowing the sequence of changes in various artifacts and features according to their stratigraphic relationship, archaeologists are able to place individual sites and areas within a site in chronological order. This technique is called **cross-dating**. When artifacts and features of similar style and decoration are found in different sites, the archaeologist can conclude that the sites were probably **contemporary** (occupied at about the same time). When archaeologists find different styles of material culture at different sites, they conclude that the sites were probably occupied at different times. And by knowing where the artifact styles fit into the overall sequence of style changes, the archaeologist can tell which sites are earlier than the other sites.

Archaeologists also use cross-dating to determine the relative ages of different parts of a site. For example, if artifacts with the same shape and decoration were found on the floors of two pit houses, the archaeologist would conclude that the pit houses were probably contemporary. If the style of artifacts found on the two pit house floors differed in shape and decoration, the archaeologist would conclude that the pit houses were occupied at different times. And because the style of pit houses changed over time, even these changes can be used to assign relative dates to sites or to areas within sites. By piecing together the evidence of artifact changes from many different sites in Arizona and New Mexico, archaeologists were able to use stratigraphy, seriation, and cross-dating to assign relative dates to almost all of the prehistoric sites in the Southwest.

Archaeologists often use relative dating techniques to determine the chronological order of a group of sites, features, and artifacts, but using relative dating techniques can be very difficult. Animals, insects, and pothunters may disturb a site's stratigraphy and make it useless for dating. There may be no decorated sherds at a site because either the people who lived there did not make or use decorated pottery or all of the decorated pottery at the site was removed by unthinking or uncaring people. In the midwestern United States, there are a lot of sites where only chipped stone pieces are found. The projectile points that were made at the sites are gone, taken away by projectile point collectors. Without the points, archaeologists cannot date the sites. So there are now hundreds of sites in the Midwest that archaeologists cannot date.

Absolute Dating Techniques

Knowing the age of one site relative to other sites is very useful but not satisfactory. Archaeologists also want to know how much older or younger one site is compared to another site and exactly when the sites were occupied. In order to get this information, archaeologists have to assign calendar dates to sites. The techniques that archaeologists use to determine what year a site was built or abandoned, a hearth used, or a pot made are called **absolute dating techniques.**

There are several ways of assigning absolute, or calendar, dates to a site. The four techniques most often used in the southwestern United States are dendrochronology, archaeomagnetism, radiocarbon, and documentation. Archaeologists can only use documentary information to date sites from the historic period because there are no written records from the prehistoric period.

Dendrochronology or **tree-ring dating,** was developed in the 1930s here in Arizona by A.E. Douglass. Douglass was an astronomer who was looking for a way to study the relationship between sunspot activity and climatic changes. Certain kinds of trees, especially conifers like pine, juniper, and Douglas fir, add one ring of wood to their trunks and large

branches every year. The width of the ring varies according to climatic conditions, especially the amount of rainfall. In dry years, the ring will be thin. In wet years, it will be thick. By boring into live trees and removing a core of wood from the trunk, Douglass was able to tell how old the tree was by counting the number of rings. And by measuring the thickness of each ring, Douglass could study the climatic changes that had occurred during the tree's lifetime.

Douglass extended the tree-ring record back by boring into older and older trees. To extend the record back even further, Douglass also took samples from the wooden beams of historic structures, and then, prehistoric structures. By matching the distinctive patterns of rings from wet and dry years, Douglass and his associates were able to set up a master chronology that reached from the 1930s to 59 B.C. Since then, archaeologists have extended the tree-ring chronology back to about 1500 B.C.

Archaeologists use dendrochronology to date the wood at archaeological sites. The prehistoric Indians in the Southwest used wood to build structures and for fuel. After collecting a sample of wood, the archaeologist sends it to a dendrochronology lab. One of the best and largest dendrochronology labs in the world is the Laboratory of Tree-Ring Research at the University of Arizona. In the lab, a dendrochronologist (a scientist that specializes in tree-ring dating) matches the pattern of rings in the archaeological sample to the same pattern of rings in the master sequence. Because the date of each ring in the master sequence is known, the dendrochronologist can tell the exact year that the tree was cut.

The archaeologist uses this information to determine what year the houses and other structures at a site were built, remodeled, or burned down. The archaeologist may also be able to tell when cooking hearths, roasting pits, or pottery kilns were used by dating the fuel wood. Using dendrochronology to date these kinds of features is not very successful, however, because the pieces of fuel wood that remain in the features are usually too small to have a datable ring sequence. By combining information from dendrochronology and from ceramic seriation, archaeologists have been able to assign year dates to particular pottery styles.

Sounds pretty easy, doesn't it? Actually, dendrochronology is very difficult. If the right information is not present at a site, dendrochronology does not work. For example, conifers are commonly found in sites in northern and central Arizona. The roof and support beams of structures in many Anasazi and Mogollon sites were made of pine logs that can be dated. But what about in the southern desert where the Hohokam lived? In the Hohokam area, conifers only grow on top of the high mountains. Because the mountains were often far away and difficult to climb, the Hohokam rarely used conifers to build structures or to use as firewood. And the few logs that the Hohokam did use were recycled over many years. Instead of conifers, the Hohokam used common desert trees such as mesquite, cottonwood, and ironwood. It is very difficult to date wood from desert trees, because they do not put on rings as consistently as conifers. Because of this, most Hohokam sites cannot be dated directly by dendrochronology.

Dendrochronology has, however, been useful in cross-dating Hohokam sites. The Hohokam, Mogollon, and Anasazi people were not only great pottery makers, they were also great pottery traders. Hohokam potsherds are often found on Anasazi and Mogollon sites and Anasazi and Mogollon sherds are often found on Hohokam sites. By combining information from dendrochronology and ceramic seriation, archaeologists working at Anasazi and Mogollon sites were able to assign year dates to the pottery styles that they found. For example, if an

archaeologist found a Hohokam sherd with a particular style of decoration on a site that had been dated by dendrochronology from A.D. 1135 to A.D. 1210, the archaeologist could then suggest that Hohokam pottery made with that particular style of decoration also dated from about the same time period. If the archaeologist then found similar pottery at a Hohokam site, he or she could conclude that the Hohokam site was also occupied from around A.D. 1135 to A.D. 1210.

This is a simplified example of dating sites. In reality, all kinds of problems arise that make dating sites very difficult. For example, what if the dated pottery was an heirloom that was kept and passed down in a prehistoric family for generations after that style of pottery had stopped being made? Then the date that the archaeologist assigned to the site based on the presence of the pottery would be too early. Another problem has to do with using wood. Freshly cut, or "green," wood is not very good building material. Wood must be left to cure or season for a while before it is used or else it may warp and cause problems. Besides letting freshly cut wood season, wood scavenged from another abandoned structure could be used. In both cases, the wood was cut before it was actually used. If an archaeologist used only the information about when the wood was cut to date the site, the date assigned could be too early.

Besides tree rings, archaeologists also use information from the burned soil of hearths or roasting pits to date sites and artifacts. This technique is called **archaeomagnetic dating**. Like dendrochronology, archaeomagnetic dating was not developed by archaeologists. The technique came from the study of paleomagnetism, a field of geology. Archaeologists adapted the geological idea to archaeological sites, and it has proven to be a valuable dating tool, especially on sites where dendrochronlogy does not work.

Archaeomagnetic dating is based on a peculiar property of soils. Many soils in the Southwest, especially desert soils, contain iron. Soils with iron can be recognized by their reddish color. When iron particles are heated, as from a fire, they become slightly magnetized. These tiny magnets align themselves with the earth's north magnetic pole. When the soil cools, the iron particles become locked in their aligned position. As long as the soil is not moved from the position that it was in when it was heated, the iron particles continue to point to magnetic north.

Did you know that the magnetic poles are not "fixed" in one place like the geographical north pole, but have moved around? Working together, archaeologists and geologists have been able to figure out where the north magnetic pole was at different times [Figure B.h.]. By comparing the direction of the magnetized iron particles in the once heated soil to the position of the north magnetic pole at different times, a range of year dates can be assigned to the last time that the soil was heated. This means that if a hearth was used for 50 years (say, from A.D. 1425 to A.D. 1475), a range of dates from around the period of its last use (for instance, sometime between A.D. 1467 and A.D. 1480) can be determined using archaeomagnetic dating.

The tricky part about archaeomagnetic dating is in removing pieces from a hearth or roasting pit in such a way that the alignment of the iron particles is not changed [Figure B.h.]. To do this, the specialist places a small, square aluminum cubelike frame around a piece of the hearth that he or she wants to date. (Aluminum is used because it is not magnetic.) Plaster is then poured around the piece of burned hearth. The plaster ensures that the position of the piece of hearth will not change when it is removed. Ten or more cubes may be taken from each feature to get a better than average reading of the alignments. The cubes, each with its plaster-encased piece of hearth, are taken to a special lab where magnetometers (instruments

used to measure magnetic fields) are used to detect the alignment of the iron particles in the sample and to compare that alignment with the movement of the earth's magnetic pole.

The relative position of the magnetic pole differs depending on where you are located on the earth. The alignment of the iron particles in a prehistoric hearth in New York is different from the alignment of iron particles from a prehistoric hearth in southern Arizona. So, the particular alignment of the iron particles as they follow the changing position of the magnetic north pole (also known as the archaeomagnetic "curve") must be determined separately for different geographical areas. A "curve" has been developed for the southwestern United States for the period from A.D. 700 to A.D. 1450 [Figure B.h.]. Unfortunately, only parts of the curve are well-dated and the path along which the magnetic pole wanders is very complex and erratic. Because of these problems, archaeomagnetic dating gives a range of dates for when a hearth was last used rather than a single year date.

As with dendrochronology, whether or not archaeomagnetic dating is successful depends on the conditions at the site. In order for the iron particles in the soil to align properly, the fire that heats that soil must be relatively hot. If the fire is not hot enough, the iron particles will not line up correctly and the hearth or other feature cannot be dated. Also, the areas of burned soil must be large enough to recover at least eight or ten samples. Several samples must be taken because some of the samples may shift position during recovery and other samples may be from parts of the hearth or other feature that were not heated well enough.

Radiocarbon dating is one absolute dating technique that is often used is probably the one that is best known. Also known as carbon-14 or C14 dating was developed in 1949 by Willard Libby, a chemist at the University of Chicago. Radiocarbon dating is the most widely used dating technique. Recently, the instruments used for radiocarbon dating have been improved. These new instruments can date very small pieces of material much more accurately than the old instruments. Radiocarbon dating is based on the fact that all living things absorb carbon from the atmosphere. There are two kinds of carbon atoms in the atmosphere: normal, stable carbon-12 and unstable, radioactive carbon-14. These two kinds of carbon atoms are also present in the bodies of living things. And the proportion of carbon-12 to carbon-14 in living organisms is similar to the proportion of these two carbon atoms in the atmosphere.

When a living organism dies, it no longer absorbs carbon. The carbon-14 present in the organism when it dies begins to break down, or decay. As it decays, a subatomic particle called a beta particle is released. As the carbon-14 decays, its proportion to the carbon-12 decreases. Carbon-14 decays at a known rate. This rate of decay is called the half-life. The half-life of carbon-14 is 5,730 +/- 30 years. This means that in 5,700 to 5,760 years, half of the carbon-14 that was present in the body of an organism when it died will have decayed. In another 5,700 to 5,760 years, another half of the remaining carbon-14 will also have decayed. So, the amount of carbon-14 left in an organism decreases gradually over time. The older the sample (and the longer time that the organism has been dead), the less carbon-14 it contains and the greater proportion of carbon-12. Also, an older sample releases fewer beta particles because there is less carbon-14 to decay.

The age of the sample is calculated from the relative proportions of carbon-14 and carbon-12 present and from the number of beta particles released. Because of the processes involved in the decay of carbon-14 and variation in the instruments used to measure that decay, radiocarbon dating also gives a range of dates rather than a single date for when the specimen

died. Radiocarbon dates for sites, features, and artifacts are usually written like this: 1020 +/- 53 B.P. "B.P." means "before present." What these numbers mean is that the organism being dated probably died between 967 and 1,073 years ago, between A.D. 1025 and A.D. 1078. Radiocarbon dating is accurate for the time period from about A.D. 1500 to about 50,000 years ago. Radiocarbon has been used to date sites from A.D. 1500 to the present, but it is not as accurate for the more recent dates.

Radiocarbon dating is a popular technique because many of the artifacts that archaeologists find on sites can be dated using this method. And, it is relatively accurate, requires very small amounts of material, and is relatively cheap. Some of the artifacts that can be dated using the radiocarbon technique include burned or unburned corn cobs, other plant material, wood, clothing, and baskets. Wood and the remains of plants that were used as food are two of the most common artifacts that archaeologists find at sites. Radiocarbon dating cannot be used to date potsherds or lithics. Another problem with radiocarbon dating is that artifacts may be contaminated by exposure to organic compounds like oil or coal. (Oil and coal are both made of the remains of decomposed organisms.) Also, the proportion of carbon-12 and carbon-14 in the atmosphere has changed over the past 50,000 years, and radiocarbon dates must be "calibrated" to adjust for changes in atmospheric carbon.

There are several different techniques that archaeologists can use to date artifacts, features, and sites. Relative dating techniques, such as seriation, stratigraphy, and cross-dating, date archaeological remains relative to other remains. Absolute dating techniques, such as written documents, dendrochronology, archaeomagnetic dating, and radiocarbon dating give a calendar date or a range of year dates. All of these techniques have certain advantages as well as problems. To avoid these problems, archaeologists must pay very careful attention to the archaeological context of the material being dated. Also, archaeologists rarely date a site based on information from only one technique. Sometimes, only one dating technique can be used, but archaeologists try to combine information from several techniques. If several different dating techniques produce similar dates, then the archaeologist can be assured that the date is probably correct. But if the dates given by different techniques do not agree, the archaeologist must be very cautious in assigning a date, or not assign a date at all. Dating archaeological remains is one of the most important, and sometimes the most frustrating, jobs for an archaeologist.

INTERPRETATION

When analysis is finished and the specialists have told the archaeologists of their findings, the archaeologists can look at how the artifacts as a group — called an **assemblage** — relate to the features that were found at a site. Using the maps of features, provenience information on the artifact assemblage, and field notes, the archaeologists can begin to put the pieces of information from the site together to make a complete picture.

One step in doing this is to look at site reports, to see how the site that was dug compares to other excavated sites. That way, the archaeologists can tell if something different was happening at their site, or if their site is typical of those in a certain area.

For example, during excavations at a Hohokam site on the east side of Tucson, archaeologists found a house that looked like it belonged to the Mogollon culture. As far as we know, the Mogollon people lived in the mountains of central and eastern Arizona, along the

southeastern border of Arizona, and in southwestern New Mexico. So, what was a Mogollon-style house doing in Tucson? Did a Mogollon person marry a Hohokam person and build a Mogollon-style house? Or did a Mogollon family come to live in a Hohokam village for some reason? The archaeologists interpreting this site may not be able to come up with an answer, but they must propose ideas about why this unusual kind of house was found at that site. Future archaeologists can then look for similar houses at sites they dig and see if there is any pattern that can be interpreted.

Another way to interpret information from a site is to compare the site and its artifacts with the life ways of historic cultures and living peoples. This type of study is called **ethnographic analogy**. An archaeologist interpreting material from a Hohokam site might compare that site with information about the historic Pima and Papago — the O'odham. Records about these people go back 300 years, and many archaeologists think that the O'odham are the descendants of the Hohokam. So, their life ways should be similar — the way they arrange their houses, the way they grow their crops, and so on. If they are not similar, it may mean that the Hohokam were not the ancestors of the O'odham, or that the life ways changed a lot from A.D. 1450 until the 1690s, when written histories about the O'odham began.

If a site dates to the historic period (after 1691 in Tucson), archaeologists may be able to find written records about the site. But they must be careful about using such records, because people write with their own biases about what they see. Also, historical records are incomplete. They usually only describe certain events, or they are records of things that to the writer seemed different or odd. So, our view of the past through historical records is skewed. Sometimes, though, archaeology can help show that the historical record is wrong or incomplete.

WRITING REPORTS

Once the archaeologists have interpreted their information, they write a report that will become the permanent record of the site. Such a record is called a site report, and it should contain these pieces of information:

I. Introduction
   - A. Why the excavation was done
   - B. Who participated in the excavation
   - C. When the excavation, analysis, and interpretation took place
   - D. A map or maps showing the location of the site

II. Description of the Environment
   - A. A general description of the region where the site lies — the Tucson Basin, for example
   - B. The geographic setting of the site: Is it on a hill, in a valley, on a mesa, along a river? How close is the nearest water?
   - C. The plants and animals found at and near the site both today and in the past
   - D. The climate today and in the past
   - E. Disturbances to the site: Are there roads running through it? Are animals digging in it? Are there houses on it or nearby? and so on

III. Culture history: What do we know, in general, about the people who lived in the area prehistorically and historically?

IV. Research Design: What questions were asked to guide the research? What did the archaeologists expect to find?

V. Excavation and Analysis Methods
   A. Excavation methods
      1. How were the grids set up?
      2. What levels and other proveniences were used?
      3. How were bags labeled?
      4. How were notes taken and maps made?
   B. Laboratory methods
      1. How were things cleaned?
      2. How were things labeled and sorted?
      3. What materials were sent to what specialists?
      4. How were things analyzed?

VI. Artifact Descriptions: Includes inventory and description of all categories of artifacts found — chipped stone, pottery, ground stone, ethnobiological samples, bones, charcoal

VII. Feature Descriptions: Includes description of all features found and the artifacts that were found in and on those features

VIII. Interpretations
   A. What was learned from the site?
   B. When were the people there and what were they doing?
   C. How do the interpretations fit with the research questions?

IX. References: What books and articles did the archaeologists use in making their interpretations?

Site reports should always be available to researchers because they are the only complete record of a site that is now partially or completely destroyed. (Remember, digging destroys a site.) Some reports are published for wide distribution, but others are kept in museums and in research libraries.

TAKING CARE OF ARTIFACTS

Once analyzed, most artifacts are placed in museums for curation, where museum professionals make a description of the artifacts (called cataloguing) and store the material, including notes, maps, and photographs. All of the artifacts and records can then be looked at by anyone researching a particular topic.

Burials are found at many sites, both prehistoric and historic. In the past, archaeologists have tended to treat the burials like any other artifact. Skeletons and burial goods were analyzed, and the materials were catalogued and stored. But recently, Indian tribes and other ethnic groups such as Hispanics have been opposed to the remains of their ancestors being kept

in museums. Arizona laws passed in 1990 now require that ethnic groups who may be descendants of the group being studied be consulted whenever human remains (skeletons, cremated bone, or mummies) are found. The ethnic groups may decide that the archaeologists can excavate and analyze the remains, that the remains must be reburied somewhere else, or that the remains must stay undisturbed in the ground at the site.

More Information on Doing Archaeology

Provenience: It is not always practical to use grids, so archaeologists have figured out other ways to control provenience information when studying a site. One way is used on large sites, such as large scatters of chipped stone artifacts or on agricultural fields, which sometimes stretch for miles. On these sites, archaeologists use transits and similar tools to plot in the locations of artifacts and features. As they are plotted, each location is given a provenience number, and the archaeologists can then pick up the artifacts and excavate the features.

Another system is used by contract archaeologists, who often have to recover a great deal of information in a very short time. They use backhoes to dig trenches at certain intervals — say every 20 meters — across the site. The trenches allow the archaeologists to get a quick look at the stratigraphy of a site and to see where features and artifacts are most concentrated. Then, they use a transit or similar tools (an alidade and plane table or a theodolite) to map in the trenches and the areas they are going to excavate. Each trench is given a number, the excavation areas around the trench are given separate numbers, and features and artifacts within the excavation area are located in relation to the trench. This system is actually a modified grid system, with the horizontal and vertical datums being located at an imaginary place off of the site.

Datum points often are related to the absolute elevation at a site. Absolute elevation is the actual height of the site above sea level. And, in addition to measuring depth from a datum point, archaeologists often use the datum to lay out grids and to make other horizontal measurements. Depending on the terrain at the site, the datum can be above the ground surface in some areas and below it in others.

Specialists: Archaeologists work with many different specialists. Geologists, geomorphologists, paleontologists, physicists, hydrologists, soil scientists, artists, architects, and engineers have all contributed to the study of archaeology. Geologists identify rock types for lithicists, ceramicists, and ground stone specialists. Paleontologists study extinct animals such as mammoths that people hunted. Geomorphologists, soil scientists, and hydrologists examine recent deposits of sediment (dirt and soil) to answer questions about flooding, erosion, or poor soil conditions. Physicists help archaeologists date sites by analyzing radiocarbon and archaeomagnetic samples. Architects and engineers can tell archaeologists how certain structures were built. And artists have long been interested in the arts and crafts of past peoples. They help archaeologists to study rock art and to understand pottery designs and technology.

Dating Techniques: There are some other dating techniques that archaeologists use besides stratigraphy, seriation, cross-dating, documentary records, dendrochronology, archaeomagnetic dating, and radiocarbon dating. Some of these techniques are experimental and some of them are used for time periods that are not useful for most archaeologists.

Potassium-Argon: Similar in principle to radiocarbon dating but measures the proportion of potassium and argon in volcanic rocks. This technique is accurate for dates from 400,000 to 2 billion years ago and is used to date the remains of the oldest human ancestors.

Fission track: Also based on the principle of radioactive decay. Measures the tracks left by decaying uranium atoms that are present in many minerals and volcanic glasses. This technique is accurate for dates ranging from 100,000 to 1 million years ago.

Thermoluminescence: Dates fired clay materials, like potsherds, by measuring the amount of light that is produced when the material is reheated. This technique is still being refined but is relatively accurate for the time period from 8,000 years ago to the present.

Amino Acid Racemization: A very experimental technique. Dates bones by measuring the changes in the structure and make-up of amino acids over time. This technique produces dates ranging from 100,000 to 5,000 years ago.

Obsidian Hydration: Obsidian is a volcanic glass. Once formed in a volcanic eruption, the outside layer of obsidian begins to absorb water. The older the obsidian, the more water has been absorbed and the thicker the layer becomes. This technique measures the thickness of the outside layer of obsidian artifacts, such as projectile points. Still being refined, the technique can produce dates from 50,000 to 2,000 years ago.

(Adapted from "Dating Techniques for Teachers (and Students)" by Richard Lange. In Archaeology in the Classroom: A Workshop for Teachers. Compiled and prepared by the Archaeology for the Schools Committee of the Arizona Archaeological Council.)

Figure B.a. Doing archaeology. Archaeologists must use many different skills to successfully record and excavate a site. (Original drawing done by R. Brittain for the Hohokam pit house exhibit at Fort Lowell Park in Tucson, Arizona.)

Can you name the different tasks shown in the picture?

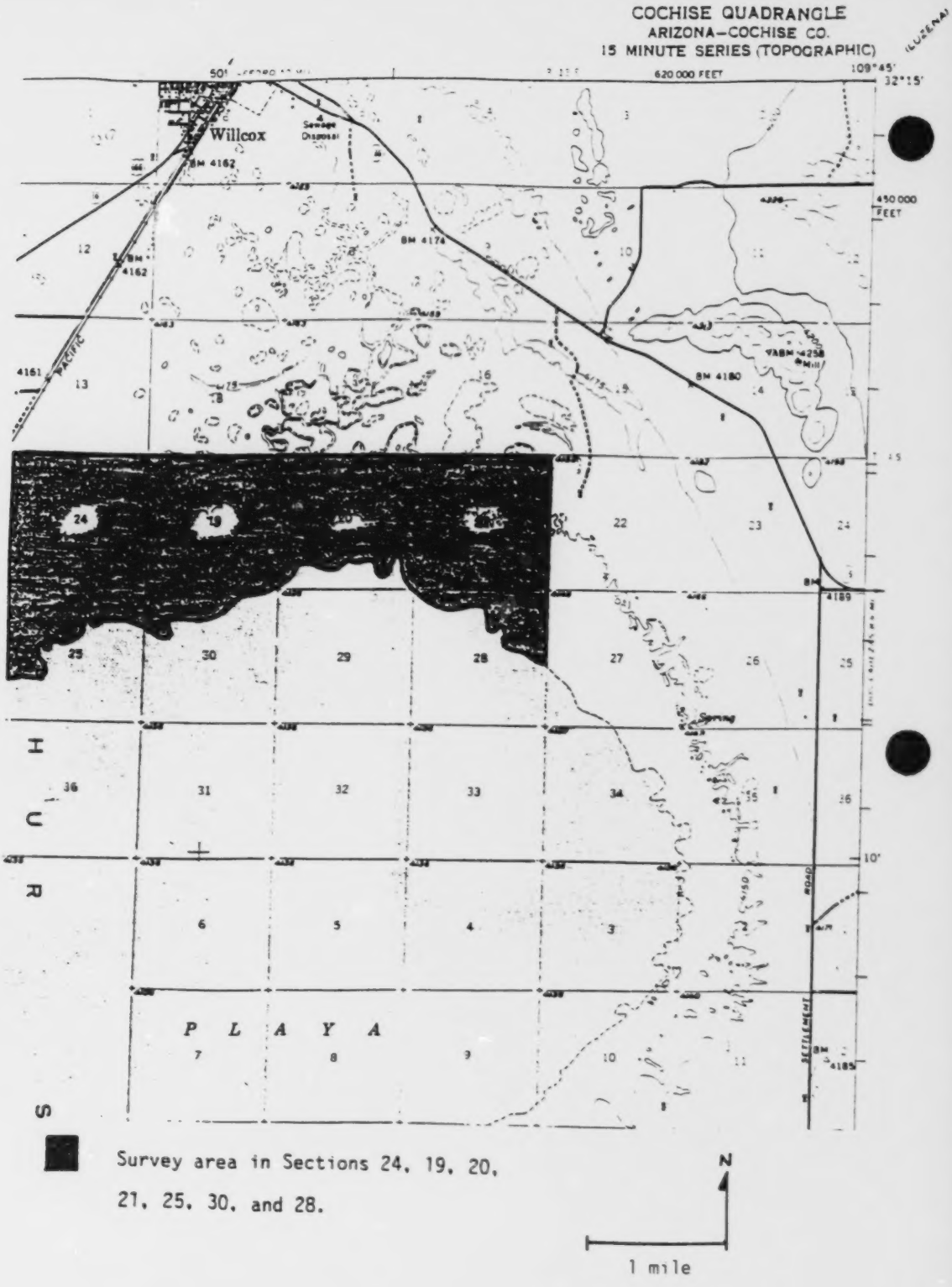


Figure B.b. Archaeological survey area marked on the Cochise Quadrangle 15 Minute U.S.G.S. Topographic Map. The survey area is located between the town of Willcox and the Willcox Playa or Dry Lake in southern Arizona.

About how many square miles does the survey area cover?

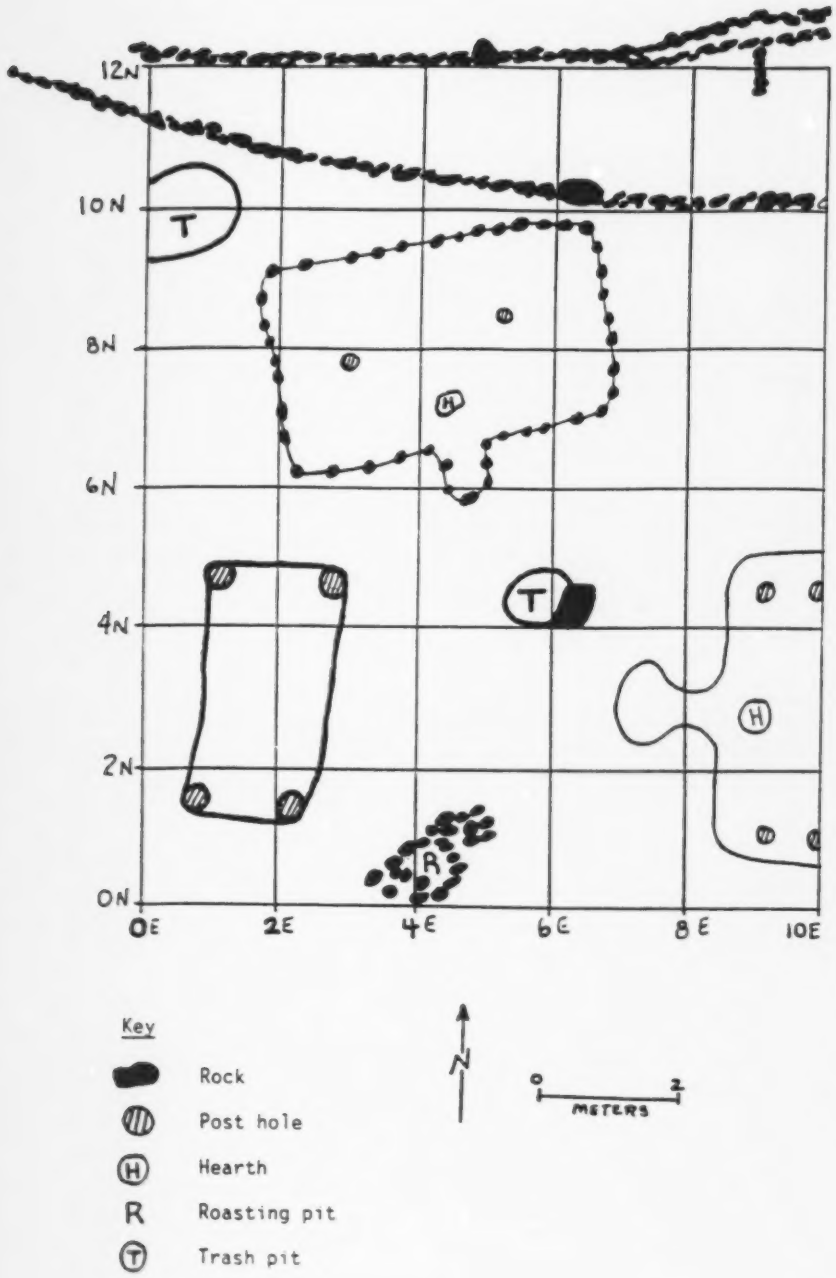
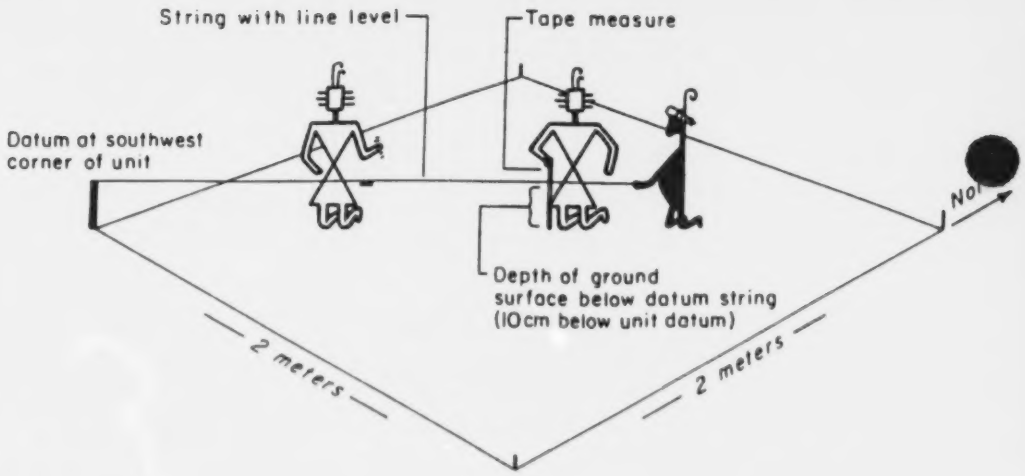
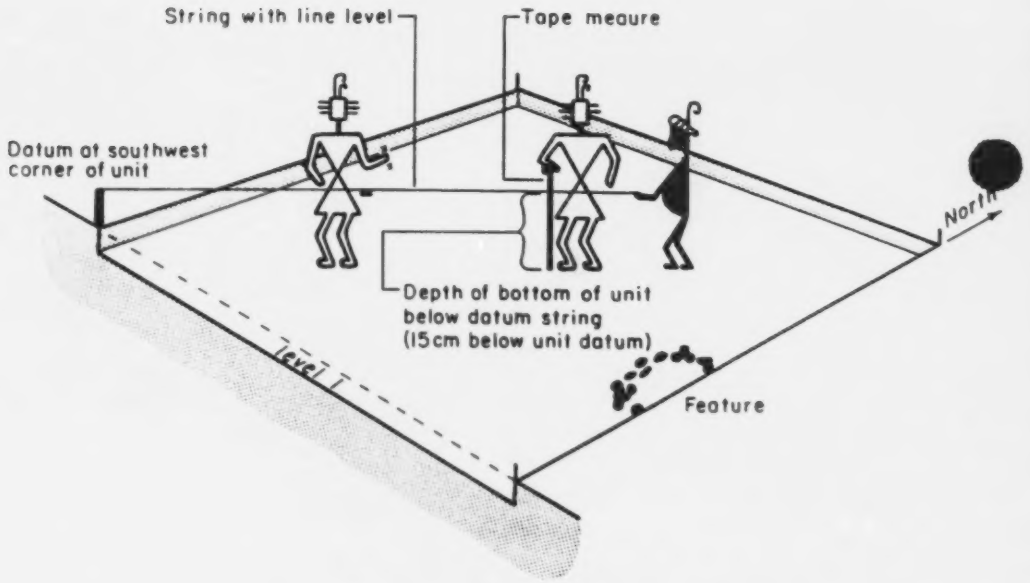


Figure B.c. A grid made up of 2 meter by 2 meter squares set up at a Hohokam village site. The grid allows the archaeologists to precisely locate the horizontal position of the structures and features at the site as they are excavated.

Find the map coordinates (north and east) for the four corners of the ramada in the southwestern corner of the grid. What do you think that the lines of rocks in the northern part of the grid represent?


String with line level
Tape measure
Datum at southwest corner of unit
Depth of ground surface below datum string (10cm below unit datum)
2 meters
2 meters

Measuring depth of the ground surface using a line level and string before excavating.


String with line level
Tape meaure
Datum at southwest corner of unit
North
Depth of bottom of unit below datum string (15cm below unit datum)
Level I
Feature

Measuring the bottom of level I using a line level and string after excavating.

Figure B.d. Using a line level to measure the depth of excavation. Measuring the *depth* of excavation allows the archaeologists to record the vertical location of artifacts and features at a site. (Illustration by R. Beckwith, adapted from page 193 in *Archaeology* by William L. Rathje and Michael B. Schiffer.)

Why is it important to know and record the depth of artifacts and features at a site? What prehistoric Southwestern culture is represented by the figures?

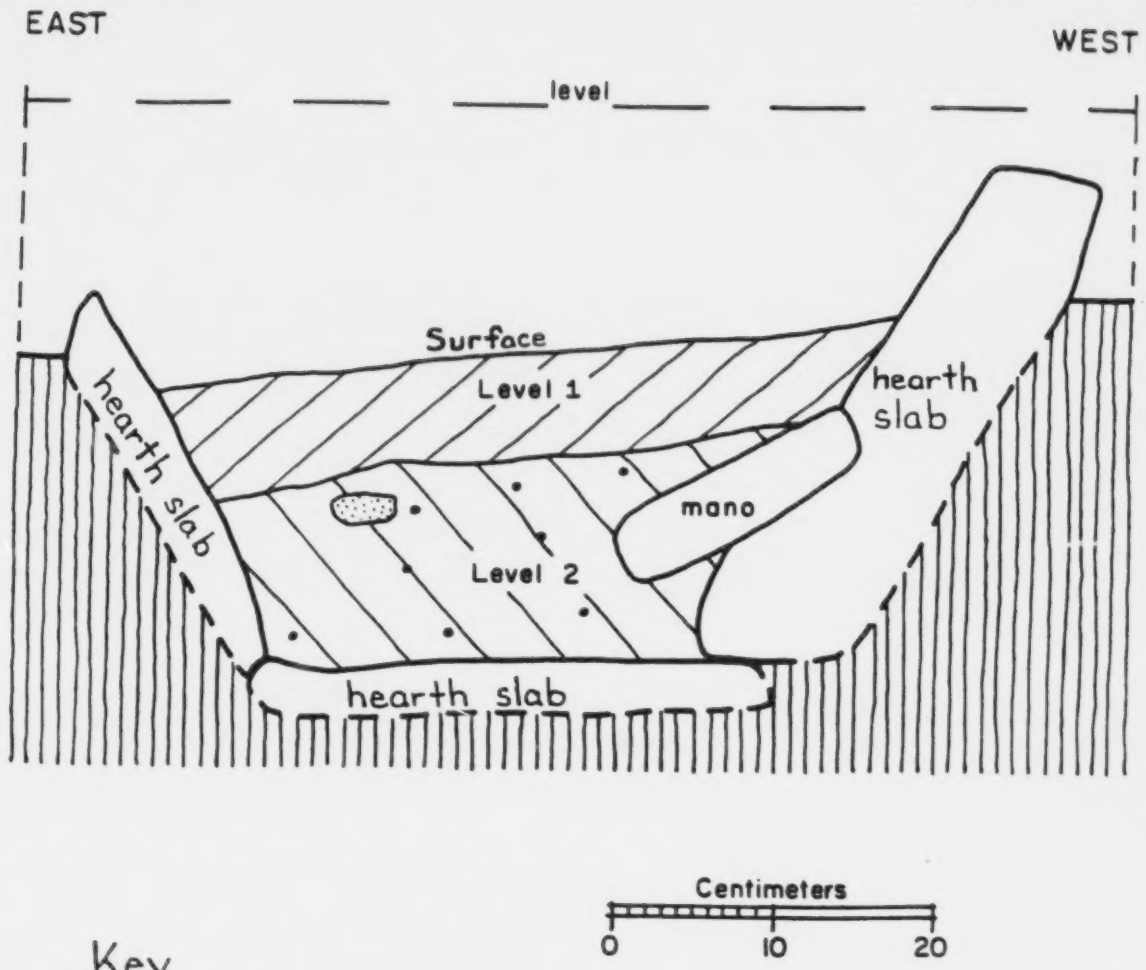


Figure B.e. A profile drawing of the stratigraphy of a prehistoric hearth. This profile drawing shows the relationship between the two levels of fill inside the hearth slabs. It also shows how the stone slabs were placed into the hole that was dug for the hearth. The profile shows that (1) the hole for the hearth was dug first. (2) Then the hearth slabs were set in place. (3) As the hearth was used, ash and charcoal (the Level 2 fill) accumulated inside the hearth, along with a rock and a mano. (4) After the hearth was abandoned, windblown soil (the Level 1 fill) accumulated inside the hearth. (Adapted from page 62 in AZ P:6:26 by Barbara J. Klie, Alan H. Simmons, and Susan Jackson)

What stratigraphic level has the burned corn kernels?

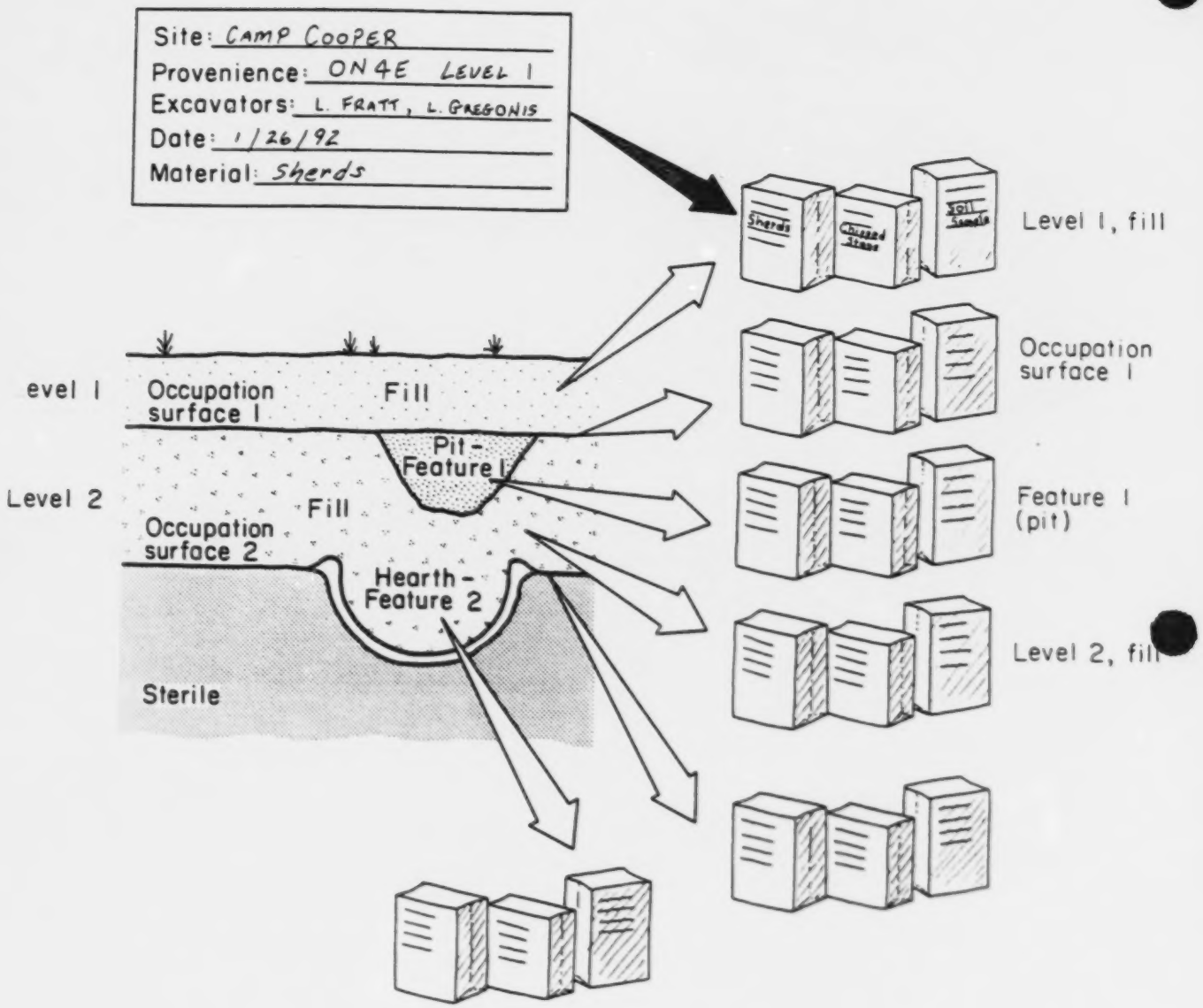


Figure B.f. Excavated artifacts are separated into types of artifacts and put into bags. The bags are then taken back to the laboratory where they are washed and analyzed. Each bag is labeled so that the archaeologist knows what kind of artifacts are in the bag, where the artifacts were found (site and provenience), who found the artifacts, and when they were found. (Illustration by R. Beckwith, adapted from Figure 7-8 in *Archaeology* by William L. Rathje and Michael B. Schiffer.)

Which bags in the drawing should be used for the artifacts from Occupation surface 2 and which bags should be used for the artifacts from Feature 2?

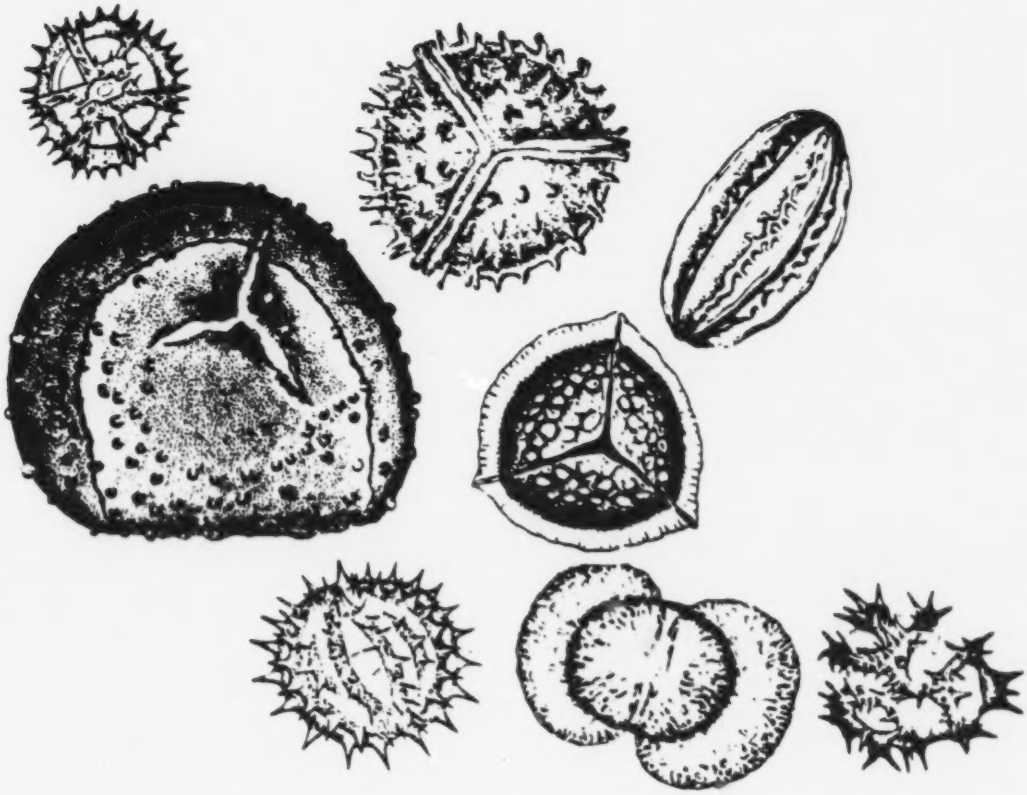
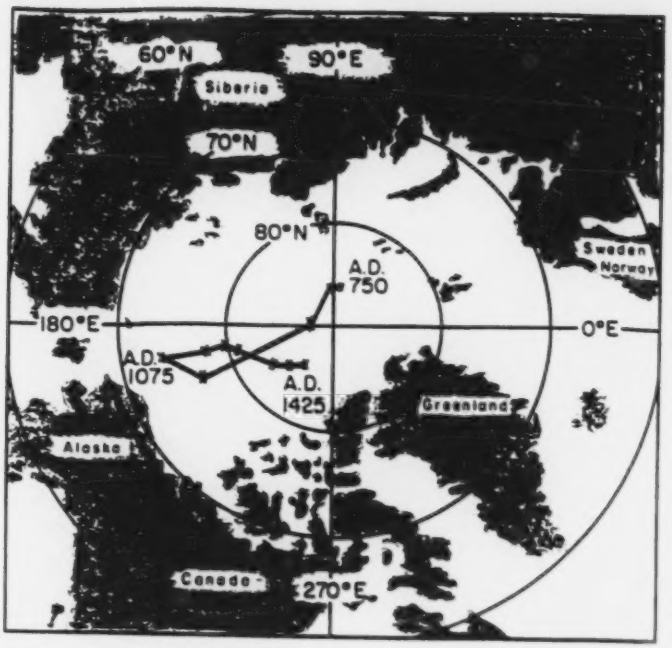


Figure B.g. Some examples of microscopic pollen grains. The illustration shows grains from common weedy plants and an important medicinal plant called *Ephedra*, as well as fossil pollen grains that date to the time of the dinosaurs and before. The drawings are about 10,000 times larger than the actual size of the pollen grains. Pollen grains are very small. You must use a microscope to see them. (From *How to Know Pollen and Spores* by Ronald O. Kapp.)

What can pollen grains tell us about the past?



B

A

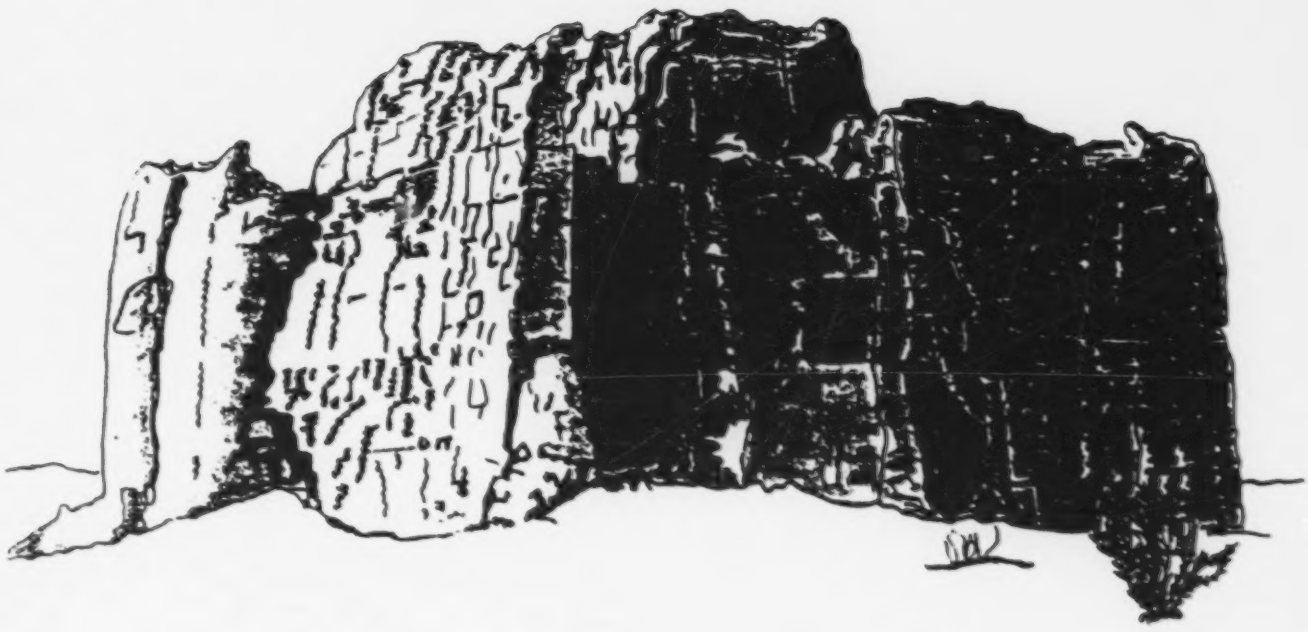
C

Figure B.h. Archaeomagnetic dating. This dating technique helps archaeologists determine the age of a site. Archaeomagnetic dating is based on the fact that the north magnetic pole changes position, or "wanders." Iron particles in burned features such as hearths (A) line up with the magnetic north pole's position (B) during the time the feature was *last* burned. The archaeologist uses hollow cubes (C) filled with plaster to remove small samples of the burned feature. The alignment of the iron particles is measured by a machine in a laboratory. (Adapted from *Archaeology in the City* by Michael H. Bartlett, Thomas M. Kolaz, and David A. Gregory.)

What kind of date does archaeomagnetic dating provide?

SECTION C

CULTURES OF THE PAST



CULTURES OF THE PAST

Archaeologists have divided southern Arizona's past into four general periods: Paleo-Indian, Archaic, Hohokam, and Historic [Figure C.a.]. During each of these periods, people lived a particular kind of life style. Their artifacts reflect the lifestyle that the people led. The type of artifact assemblage as well as information from dating techniques, tell the archaeologist to which general period a site dates. But how long have people been living in southern Arizona?

CROSSING THE BRIDGE

In most American history books, we read about how Christopher Columbus sailed across the ocean and "discovered" America. There are two problems with the way we have recorded Columbus's voyage. First, Columbus thought he had reached land that was connected to Asia, so he called the people he met Indians. (Because the term "Indian" is a misnomer, some "Indians" prefer being called "Native Americans.") Second, the "New World" had actually been discovered by people thousands of years before Columbus was born.

These people did not sail across the Atlantic Ocean to get here. Instead, they came over from what is now Siberia. When they came, they probably did not even know they were moving onto a new continent, where no people had ever been. That's right, there were no people in either North or South America until the Indians got here.

Between 12,000 and 15,000 years ago, the Indians walked to the New World across what is now the Bering Sea [Figure C.b.]. It was dry land when they came across. Why? Because during that time, near the end of the Ice Age, much of the water now in our oceans was frozen; it became the ice in the great continental glaciers. This made the sea level go down, and the land under the Bering Sea was exposed.

Why did people walk from Siberia to what is now Alaska? Probably because they were hunting game animals, such as bison, mammoth, elk, moose, or reindeer [Figure C.c.]. And where the animals went, the people went. Animals accidently wandered out into the valley that is now the Bering Sea, migrating to find food. Perhaps hunters chased the animals into Alaska.

The earliest people in the New World could go anywhere they wanted, except for the areas where there were glaciers. When the population grew too large in an area, a group of people would move out. Animals that migrated north and south every year probably attracted the Indians, too. By following the migrating animals and moving to a new area whenever there were "too many people," the Indians spread out over the continents of North and South America.

By the time large animals such as mammoths and ground sloths died out around 8,000 years ago, there were people all over the "New World."

MAMMOTH HUNTING

Imagine that three hunters spent four days following a wounded mammoth. They were almost ready to give up and return to the rest of their people when they discovered the animal caught in mud at the edge of a small pond.

The mammoth, thirsty, hungry, and weakened from spear wounds, was stuck. Earlier, as it tried to get a drink, one of its feet had become stuck, and while struggling to get free, the mammoth worked its way deeper into the mud. It was soon exhausted and belly deep in muck, making it easy for the hunters to kill.

Now the real work began — butchering the animal and preserving its meat. One hunter went back to bring families to the kill, while another sat down and began to chip stones into pieces to make cutting tools. The third hunter found some rocks to make into chopping tools. The families arrived just after the two tool-makers made a slice down the mammoth's back, exposing the animal's meaty ribs. After several days of chopping, cutting, and drying the meat, the work was finished, and the families had a good supply of food.

Scenes like the one just described were probably common during the Ice Age, when people hunted large animals for food. These people, known as **Paleo-Indian Big Game Hunters,** lived in North and South America from around 13,000 to 9,000 years ago.

Archaeologists call these people Paleo-Indian Big Game Hunters because they are the ancestors of modern-day Indians, and because what we know about them comes primarily from "kill sites," places where they killed and butchered large animals such as mammoth, bison, horses, and camels. Although we think of the Paleo-Indians as hunters of big game, in fact, they probably spent more time hunting small animals and collecting berries, roots, and plant seeds than they did hunting mammoths. Evidence of smaller animals and plant foods has not, however, been found.

It is much easier to spot a large leg bone sticking out from the side of an arroyo than it is to spot the dark stain from a campfire, so archaeologists have tended to study the kill sites and have had problems finding Paleo-Indian camping and living sites. As a result, we know many details about how the Paleo-Indians killed and butchered animals, but very little about what kinds of dwellings they made, how they dressed, or about the other types of food they ate.

Archaeologists think that the Paleo-Indians moved around, following herds of game and searching out plant foods that ripened at different times of the year. Their houses were probably simple, perhaps like **wickiups**. We do not know if they made baskets for carrying their things, but we do know that their stone tools, especially their projectile points, were carefully made [Figure C.c.].

END OF THE ICE AGE

Around 10,000 years ago, the Ice Age ended [Figure C.a.]. At that time, many animals, including mammoths, became extinct. People came to rely more and more on gathering plants and hunting smaller animals such as deer and rabbits for food and other necessities. They followed a **seasonal round,** moving from place to place to gather ripened seeds and nuts and

to hunt animals. In what is now southern Arizona, spring would find them camped near a stream in the grasslands [Figure C.d.], hunting for birds' eggs and collecting green leaves from newly sprouted plants. During summer they moved to the desert where they gathered cactus fruit and mesquite beans and hunted rabbits and bighorn sheep. Then they went to the mountains to gather acorns and pine nuts and to hunt deer. Winter found them in a sheltered area, such as a rockshelter or cave.

Archaeologists call the culture of the people who followed this way of life the **Archaic culture.** This life way lasted from around 10,000 years ago (8,000 B.C.) to about 1,800 years ago (A.D. 200).

AMERICA'S FIRST FARMERS

Imagine that about 7,000 years ago in Mexico, a group of Indians camped at a small rockshelter near a stream. Early in the day, they had collected seed from a large, grass plant called teosinte (tay-o-sin-tay). Some of the group used flat stones to grind the seeds into flour, to use in their evening meal. During the process, some seeds were spilled and left on the ground in front of the shelter. After three or four days at that campsite, the group moved on, leaving the spilled seeds to sprout in the soil.

About four months later, the people came back to their campsite and to their surprise found that the teosinte had grown and was ready to harvest. They collected the seeds, but this time decided to plant a few of the larger ones, hoping that they would grow and be a more dependable source of food. Over the next few years, the people found that they could plant the seeds in early spring and come back a few months later to find a ripened crop. And they found that if they planted larger seeds, the plants produced larger seeds and more of them.

Often the harvests were destroyed by hungry coatis or birds and the people would have to start over again. They began carrying seeds with them and planting them at all of their campsites, trying to find the best places to grow the new food. By leaving three or four people at a spot to guard the crop, the people found that they could get two or three times as much grain to eat and seeds to plant.

After a time, the people found that it was easier to stay in one place, growing and harvesting the once wild plants. They had become farmers.

By selecting larger seeds and protecting the plants, the people slowly changed the teosinte from a wild plant into the domesticated plant we call corn [Figure C.e.]. The people also found other plant seeds that adapted well to being grown in protected areas. Soon they had a number of domesticated plants besides corn, including beans, squash, and cotton. Domesticating plants was one of the most important accomplishments of the Archaic people.

Once plants had been domesticated, the seeds were carried — perhaps traded for wild foods — to people all over Mexico and the southern United States. The idea of farming caught on slowly, but by about 3,000 years ago, people in Arizona also were growing a few crops.

At about the same time, the Archaic people began to dig pits to store foods for later use and to build houses by digging a hole in the ground, building a frame of poles around or in the pit, and covering the framework with brush and mud [Figure C.d.].

VILLAGES AND CULTURES

As the people grew crops, built houses, and dug storage pits, they moved around less and less. Although they still went out to gather wild foods and to hunt, they returned to their houses and fields, and so began living in more permanent villages.

After several generations of living in one region, their way of life was noticeably different from people living in other areas. Eventually, houses varied from region to region, as did their basketry, their clothing, even their weapons and grinding stones.

About 2,000 years ago, people in the southwestern United States discovered how to make pottery. Today, archaeologists distinguish various groups of prehistoric people on the basis of how they made their pottery, how they built their houses, and how they made their tools. Archaeologists have given distinct names to groups, although they do not know what those groups called themselves. In Arizona, there are several prehistoric groups or cultures. On the plateaus of northern Arizona lived the **Anasazi** (Ahn-ah-sáh-zee) [Figure C.f.]. In the central and eastern mountains were the **Mogollon** (Mow-goy-óhn) and in the western desert were the **Patayan** (Pah-tay-on) or **Hakatayan** (Hah-kah-tay-on) peoples. The **Hohokam** (Ho-ho-káhm) lived in the Sonoran Desert region of south-central Arizona. In between the Hohokam and the Anasazi were the **Sinagua** (Sin-ah-wa) people, and later, in between the Hohokam and the Mogollon were the **Salado** (Sah-lah-doh).

Our focus is on the Hohokam, who lived in the Sonoran Desert from about A.D. 300 to A.D. 1450 [Figure C.a.].

HOHOKAM: DESERT FARMERS

About a thousand years ago in the valley we call Tucson, the people we call the Hohokam lived in villages, mostly along shallow, flowing streams. Walking through a village, a person would have seen low, brush-covered houses arranged in groups of two or three around an open work area or plaza [Figures C.g. and C.h.]. Children and dogs played in the plaza, while their parents ground corn, made clay pots, and chipped stone into tools in the shade of a ramada. To one side of each group of houses was a place where the people threw their trash. In the evenings, coyotes might prowl near the mounds of trash, chasing insects, digging up rodents, and eating discarded food.

During the spring and summer, the people tended crops in their fields, which were planted along the rivers or where water would run down from higher areas. Where possible, they dug irrigation ditches to bring water to their fields from the river [Figure C.i.]. If the people lived near the mountains, they built lines of stone that acted like small dams to capture soil and guide rainfall to their gardens. Corn, beans, squash, cotton, and agave could be seen growing in the fields and gardens.

To add to their crops, some people hunted for rabbits, deer, big horn sheep, and other animals, while others collected saguaro, cholla, and prickly pear fruit, mesquite beans, seed from grasses and plants, and greens.

The Hohokam wore simple clothes — probably skirts or breechcloths of cotton or agave fiber, sandals of yucca leaves, and capes or blankets of cotton, agave, deer skin, or rabbit fur

when it was cold. Most of the people wore jewelry — earrings or nose ornaments of turquoise or shell, shell bracelets, and necklaces of stone and shell.

Some Hohokam villages had ball courts [Figure C.j.]. These were large, oval-shaped areas with low earthen banks where a soccer-like game may have been played. The villages with ball courts were often larger than the villages around them. These large communities probably were centers where people came from the surrounding area to participate in festivals, rituals, and other activities.

When a person died, relatives usually cremated the body and some personal belongings and buried the ashes and burned bones in pits and or in pottery jars and bowls.

CHANGES IN THE HOHOKAM WORLD

Like any people, the Hohokam did not stay the same through time. About 900 years ago (around A.D. 1100), they began to build earthen mounds with flat tops that archaeologists call platform mounds. Eventually, these mounds replaced ball courts. At the same time, many smaller villages were abandoned. In the larger villages people began to build houses that were attached to one another (like those of the Pueblo people) or were in compounds — groups surrounded by rock and adobe walls. In some villages, people constructed houses on the platform mounds.

Then about 540 years ago (around A.D. 1450), the Hohokam abandoned their villages. Archaeologists do not know exactly what happened, but have several ideas. These include (1) warfare (the Hohokam fighting among themselves), (2) drought and floods (that destroyed their irrigation systems and their fields), (3) environmental destruction (brought about as the Hohokam cut down trees and overfarmed the desert), and (4) disease.

The Hohokam may have migrated out of the region (perhaps to Mexico) or they went back to a simpler sort of life. But they did not disappear! When the Spanish entered southern Arizona in the mid-1500s and again in the late 1600s, they found Indians — the **Pima** (Pee-mah), **Papago** (Páh-pah-go), and **Sobaipuri** (Soh-báy-poo-ree) — living in villages the Spanish called **rancherias** and growing crops and gathering wild foods in much the same way as the early Hohokam.

NEW PEOPLES

Late in prehistory, sometime between A.D. 1400 and 1500, the people we call the **Apache** and the **Navajo** entered the southwestern United States from the north. The Apache and Navajo were nomads whose ancestors had migrated from Canada and Alaska, where their nearest relatives, the **Athapaskans**, still live. Archaeologists do not know exactly when the Apache and Navajo came into Arizona, but they think it was in the late 1500s or early 1600s. The Apache and Navajo made their living by hunting, gathering crops, farming a little, and by raiding other groups of people.

At about the same time the Apache began causing problems for the villagers in southern Arizona, another new group of people came in from the south. These were the Spanish, who, with the help of Indian guides, began to explore Arizona and New Mexico [Figure C.a.]. In 1539, Fray Marcos de Niza and the Moorish slave, Estevan, came into Arizona. They were

followed in 1540 by Francisco Vasquez de Coronado, who traveled with his expeditionary forces through southeastern Arizona to reach the imagined riches of the Seven Cities of Cibola in New Mexico.

In the southwestern United States, the period of time between Coronado's entry into Arizona in 1540 and "true" historic times (1690s and later for southern Arizona) is often called the **Protohistoric** period. Archaeologists have a hard time finding Protohistoric sites, because during that period new technologies and new life ways were introduced, people moved from place to place, and diseases reduced the numbers of people. Cultures changed rapidly, and they sometimes seemed to disappear from the archaeological record.

HISTORIC TIMES

In the 1690s, the Spanish became interested in an area known as the Pimeria Alta (region of the Upper Pima), which included most of southern Arizona. They decided to establish missions in the region, and they sent Father Eusebio Kino and a party of soldiers to explore the territory. Kino built simple churches and chapels at places where the Pima, Papago, and Sobaipuri Indians — the O'odham (Uh-uh-tahm) — already had villages. He brought cattle into Arizona and taught the Indians how to raise livestock and wheat. He introduced them to a new religion — Christianity — and showed them metal tools. Kino and the people traveling with him changed the lives of the O'odham forever. Archaeologists have never been able to find the structures Kino built, but at several places later mission buildings remain — at Guevavi (near Nogales), at Tumacacori [Figure C.k.], at San Xavier del Bac, and at San Agustin (at the foot of A Mountain), as well as at several towns in Mexico.

Spanish settlers and miners followed Kino and other missionaries, and by the 1750s, the government found it necessary to build forts, or **presidios**, to protect those settlers against the Apache, who became enemies of the O'odham and the Spanish. The Apache raided the Sobaipuri who lived in the San Pedro Valley so often that the Sobaipuri eventually abandoned their villages and went to live with their relatives at San Xavier del Bac. In the Santa Cruz Valley, the first presidio was built in 1752 at Tubac. The soldiers at Tubac were moved to Tucson in 1776 to establish a new presidio there. Archaeologists have studied both of these presidios.

The Spanish settlers continued to ranch and mine in the region, while at the mission villages the O'odham adopted the new ways into their culture. Things changed very little even after Mexican independence in 1821 and the Mexican-American War in 1846. When Americans came through the region on their way to the California gold fields in 1849, they found Tubac and Tucson to be small, quiet villages of adobe houses. The villages were areas of refuge for the ranchers and farmers scattered up and down the Santa Cruz River, who were periodically driven off their land by the Apache. It was a big occasion when wagonloads of new goods came up from Hermosillo. People used and reused their ceramic **majolica** dishes, their copper chocolate pots, and plates, and their metal forks and spoons until nothing was left. They relied on the Indians for their ceramic water jars and cooking pots. The rest they got from the land. It is sometimes difficult for archaeologists to tell whether a site from this time period is an Indian site or a Spanish or Mexican site, because the artifacts were shared by both groups and Christianized Indians lived in houses similar to those built by the Europeans.

In 1854, the Gadsden Purchase made southern Arizona (from the Gila River south) part of the United States. (The rest of Arizona had already become part of the United States as a result of the war with Mexico.) Americans began to trickle in from the eastern United States and from California. Some were miners and mining engineers; others were ranchers or farmers; and still others were merchants. Most were men. Some tried to fit into the local culture, marrying Mexicans and Indians and adapting to their ways; others tried to make Arizona more like the rest of the United States.

There were few changes in the Mexican life-style of southern Arizona until the Southern Pacific Railroad was built in the 1880s. Then, goods from the east and west coasts flowed into southern Arizona, and American culture became dominant. Archaeologists studying historic sites in southern Arizona can tell whether they are looking at a site from before or after the building of the railroad by the types of artifacts present, such as American-made bottles and ceramics, and by the "new," non-Mexican styles in buildings.

Today, Arizona has many cultures that all interact with one another and together are part of American culture [Figure C.1.]. As a part of the American culture, we share similarities, but there are differences among us, too. We may eat and enjoy different things than our neighbors, dress in different ways, and hold different religious beliefs. But, for the most part, the artifacts and features we use in our everyday lives are very similar. How would future archaeologists studying today's American society tell the difference between a house that was lived in by a Chinese family and another lived in by a Tohono O'odham (Papago) family? How would archaeologists know what people did for a living? What clues would archaeologists look for?

More Information on Culture History

Culture vs tribe: The term tribe refers to a very specific type of social and political organization. It is often based on kin lines — family, clan, and so on. Archaeologists use the term "culture" to refer to a prehistoric group of people rather than tribe, because we do not know how those people actually organized themselves. There probably was no such thing as a Hohokam "tribe." There may, however, have been a Tucson Basin "tribe" of Hohokam and a Phoenix Basin "tribe." An example of tribe vs. culture can be found among the Apache. There is an Apache culture, but each large kin group — the Chiricahua (Chee-ri-caw-uh), Tonto (Tohn-toh), Aravaipa (Ahr-ah-vy-puh), Mescalero (Mes-cah-leh-roh), Jicarilla (Hee-cah-ree-yah) — within the culture recognizes itself as a distinct entity, a tribe or band.

Paleo-Indians: Though there is much speculation about the dates, many archaeologists think that the Paleo-Indians arrived in North America between 12,000 and 15,000 years ago. (10,000 to 13,000 B.C.) The climate was cooler and wetter then, with less change from season to season. Junipers, pinyons, and oaks could be found at lower elevations, and there were many shallow lakes and swamps. At that time, in southern Arizona, the Willcox Playa was a lake. Although there were a few saguaros, creosote bushes, and palo verde trees in the desert areas, they were found alongside plants such as juniper and oak that are now found at higher elevations.

In Arizona, the Paleo-Indians hunted one or two animals at a time, but out on the Great Plains, the Indians often stampeded 20 or 30 bison into a ravine or over a cliff, leaving a mass of bone. This hunting technique was used on bighorn sheep in the Colorado Rockies, and a similar technique was used in northern Arizona to drive pronghorn into deep trenches. The "drive" method continued into historic times on the Great Plains.

By 6,000 B.C., many animals had become extinct in North and South America. Among them were mammoths, horses, ground sloths, camels, dire wolves, mastodons, and the type of large bison hunted by Paleo-Indians. Paul Martin, a paleoecologist at the University of Arizona, has long promoted the idea that the Paleo-Indian hunters killed off mammoth and other big game. The theory is controversial because animals not generally hunted by people — ground sloths, dire wolves, lions — died off along with game animals. It is very possible that people killed the last mammoth, just as they did the auk and the dodo, but most scientists think that climate change had more to do with the extinctions than people.

Archaic culture: One of the hallmarks of Archaic culture is the grinding stone, which the Paleo-Indians apparently did not use. Hand stones and grinding slabs (later replaced by the more efficient mano and metate) and mortars and pestles were a major technological innovation that changed peoples' diets dramatically. The Archaic people used these grinding tools to crush acorns and other nuts into flour (as the California Indians did in historic times). Hand stones and grinding slabs contributed to the spread of farming and to making corn an important part of the Indian peoples' diet.

Archaeologists have found early evidence of domesticated plants at sites in the San Pedro Valley of southern Arizona and in caves near the San Agustin Plains in western central New Mexico. Dating of corn is very complicated, and there are changes with each new archaeological study. The latest information is that corn, beans, and bottle gourds appeared in the Southwest around 3,000 years ago (1,000 B.C.).

Anasazi: Anasazi means "enemy ancestors" in Navajo. The Anasazi lived in northern Arizona, northern New Mexico, southern Utah, and southwestern Colorado from about A.D. 200 to A.D. 1500. During the early period, they lived in small villages of pit houses, growing crops, hunting, and gathering wild foods. Later, they built above-ground structures for storage. These above-ground structures eventually became their living quarters, and the pit houses became ceremonial structures, known today as **kivas.**

Between A.D. 1100 and 1300, the Anasazi abandoned some of their territory. Droughts, overuse of desert land, and movements of other people (the Ute and Paiute) have all been suggested as reasons for the abandonment. By A.D. 1350, the Anasazi had congregated in three areas, the Little Colorado River valley and the Hopi mesas of north-central Arizona, the Zuni-Acoma area in western north-central New Mexico, and the Rio Grande Valley from Socorro to Taos. Most archaeologists and many Indians think that the Anasazi are the ancestors of the modern Pueblo people.

Mogollon: This culture was named after the Mogollon Mountains of New Mexico and Arizona. Like the Anasazi and the Hohokam, the Mogollon culture began around A.D. 200. People lived in circular and oval pit houses in small villages on high knolls. Like the Anasazi, the Mogollon later built pueblos, kivas, and cliff dwellings. Archaeologists think that after A.D. 1200, some of the Mogollon joined with the Anasazi at the villages of Hopi and Zuni.

Hohokam: Hohokam means "all used up" or "those who have gone" in Piman. The Hohokam lived in an area from just north of Phoenix to near the Mexican border, and from the San Pedro Valley (east of Tucson) to Gila Bend. We do not know where they came from. Hohokam culture either developed from the Archaic culture in southern Arizona, or a group of people migrated north from Mexico, bringing their own ideas about ways of doing things with them. Hohokam culture lasted from about A.D. 300 to A.D. 1450 — over 1,000 years.

Many archaeologists think that the Hohokam had strong contacts with **Mesoamerican** cultures in Mexico and Central America. Items such as copper bells, macaws, and a few pottery vessels, were traded from Mesoamerican cultures to the Hohokam. Some Hohokam art and architecture came from Mesoamerican ideas (perhaps "filtered" through a number of different cultures as they came north). Clay human figurines, ball courts, and platform mounds are examples of things made and built by the Hohokam that probably had their origins in Mexico.

Ball courts, especially, intrigue archaeologists. Hohokam ball courts are oval or round features with earthen embankments surrounding a flat, interior surface or floor [Figure C.j.]. The embankments may have been as high as 5 meters above the floor at the time the Hohokam used the ball courts. The courts vary in size — some are almost 70 meters long, others are only 20 meters long.

Archaeologists <u>do not know</u> if ball games were played in these features. They have theorized that the large features are ball courts, because the courts somewhat resemble features found in Mesoamerica that were being used to play a ritualized ball game at the time the Spanish arrived. Additional evidence is scarce. Some clay figurines made by the Hohokam seem to be dressed the way ball players were in Mesoamerica, and a **guayule** rubber ball has been found in a Hohokam site. It is possible that a ball game or other type of game was played in the courts, but it almost certainly was not as bloody as versions of the games played in

Mesoamerica, which included human sacrifice. There is no evidence for human sacrifice in Hohokam culture.

There are other ideas about the Hohokam use of ball courts. One is that the features were trading areas — sort of like swap meets. Another is that the courts were dance plazas. The Pima call one ball court at the site of Snaketown "Bat Man's Dancing Place," and think that the earth embankments were formed when lines of dancers facing one another kicked dirt up behind them as they moved back and forth. There is archaeological evidence for dancing in Hohokam culture. Dancers are depicted on ceramics and rock art.

The Hohokam stopped using the ball court features around A.D.1200, about the same time that platform mounds — earthen structures with flat tops — came into widespread use.

Other Cultures: Other prehistoric cultures in Arizona include the Salado, the Sinagua, the Cohonina, and the Patayan or Hakataya. The Sinagua and Salado lived in central and central-northern and southeastern Arizona, between the Anasazi, Mogollon, and Hohokam peoples. The Patayan or Hakataya may have been the ancestors of the modern Yuman (Quechan) peoples, who lived along the lower Colorado and Gila rivers. The Cohonina people lived in and around the Grand Canyon and along the Colorado River. They are thought to be ancestral to the modern Havasupai and Walapai tribes.

Trade and Communication: All of the prehistoric groups in the Southwest traded ideas and goods with each other and sometimes migrated from one region to another. The southwestern trade network extended south into Mexico, south and west to the Gulf of California and the Pacific Coast, north into the Great Basin, and east onto the Great Plains. Among the things traded were macaws and copper bells from Mexico, sea shells from the Gulf of California and the Pacific Coast, turquoise from mines in New Mexico, cotton from southern Arizona, and bison hides and meat from the Plains. Ceramics of different southwestern cultures also were traded throughout the Southwest and beyond.

The trade routes were also used for communication. After the conquest of the Aztecs, the Spanish learned about the Indians on the "northern frontier" by talking to people who had traveled the trade routes. When Marcos de Niza in 1539 and Coronado in 1540 came into the Southwest, they were probably following a well established trade route.

When in the World

The prehistory of southern Arizona did not exist in a vacuum. Events were happening all over the world at the same time things were going on here. This will give you some idea of the many events that happened during prehistoric times, from about 12,000 B.C. to A.D. 1540.

15,000-12,000 B.C.: People throughout the northern hemisphere hunted mammoth and other large animals. People crossed over the Bering Land Bridge. Mammoths, ground sloths, and dire wolves roamed through the Southwest.

10,000 B.C.: People in Turkey began to grow wheat. The Paleo-Indian big game hunters moved south and moved into the Southwest.

8,000 B.C.: The Ice Age ended, glaciers began to recede, water levels rose around the world, cutting off the Bering Land Bridge. Early farming and town life began in the eastern Mediterranean. Paleo-Indians hunted big game on the Great Plains and in the Southwest. In the area that is now California, Nevada, and Utah, people began to gather plant foods and hunt smaller game — the Archaic culture began.

7,000 to 6,000 B.C.: Around the world, the climate fluctuated a lot; droughts and floods, long, cold winters and hot summers caused problems for plants and animals. Mammoths, sloths, dire wolves, and other animals became extinct. Farming began in Egypt and Greece and cattle, goats, pigs, and sheep were domesticated. The land bridge between Great Britain and France was cut off, making Great Britain an island. Farming began in South America and possibly in Mexico. The Archaic culture began in the Southwest.

6,000 to 3,000 B.C.: Farming spread as far north as the Netherlands. Horses were domesticated. In Mesopotamia, writing was developed and the first cities were built. Farming began in China. Llamas were domesticated in South America.

3,000-2,000 B.C.: The Sumerians invented cuneiform writing. Hieroglyphics were developed in Egypt. Judaism began. People in the Middle East and India began to work with metal. Village life began in Mexico and Central and South America.

1,000 B.C.-500 B.C.: The great cultures of the Mediterranean and Middle East flourished. Wars became large-scale and mass migrations occurred. Phoenicians developed an alphabet. The Aryan culture was at its peak in India. Buddhism was founded in India. Dynasties ruled feudal towns in China. The Olmec culture arose in Mexico. Corn and bottle gourds were brought into the U.S. Southwest, and people began to farm.

500 B.C.-A.D. 0: Greek culture flourished. Alexander the Great conquered large amounts of territory in the Middle East. Wars were common in the Mediterranean and the Middle East. The caste system developed in India. The Great Wall of China was built. The town of Teotihuacan, in the Valley of Mexico, was built. People in southern Arizona began to live in villages.

A.D. 0-300: Christianity originated and spread. Rome ruled the Mediterranean and Europe. Buddhism was introduced to China. The Nazca culture flourished in Peru. Villages developed in Maya country. The Hopewell culture (mound builders) began along the Mississippi. People in the American Southwest began making pottery. The Hohokam, Mogollon, and Anasazi cultures began.

A.D. 300-700: Islam began. Rome was destroyed by Vandals. The black plague spread through Europe. Gunpowder was invented in China. The Hohokam culture spread through the Sonoran Desert region.

A.D. 700-900: The Dark Ages began in Europe. The Arabs were in control of land from Portugal to China. Charlemagne lived. The Vikings attacked much of northern Europe. Mayan civilization flourished in Central America. Effigy mounds were built in the Ohio and Mississippi River valleys. The Anasazi began to build above-ground structures. Ball courts were built throughout the Hohokam region.

A.D. 900-1000: The Holy Roman Empire was founded. Mayan civilization collapsed. The Anasazi built the pueblos in Chaco Canyon. The Hohokam started to build platform mounds.

A.D. 1000-1100: The Crusades began. Leif Erickson went to Vinland, which was in eastern North America. William the Conquerer invaded England. Sunset Crater near Flagstaff erupted several times.

A.D. 1100-1300: Marco Polo traveled throughout Asia. The Mongols attacked Europe. Many European cathedrals were built and several universities were founded. The Crusades ended. Temple mounds were built in the Mississippi and Ohio River valleys. People on the Plains lived in villages and farmed. Chaco Canyon was abandoned. Cliff dwellings and pueblos were built throughout the Southwest by Anasazi and Mogollon peoples. The Hohokam began to build villages with compounds.

A.D. 1300-1539: The European Renaissance occurred. The Europeans began exploring the world, in search of riches. The ancestors of the Apaches moved south onto the Plains, and the Utes became an identifiable group in the Great Basin. The Anasazi and Mogollon (now known as Western Pueblo) congregated in villages on the Hopi Mesas, at Zuni, and in the Rio Grande Valley. The Hohokam culture "disappeared." Columbus "discovered" America. Hernan Cortez and his army conquered the Aztecs in Mexico. Francisco Pizarro and his army invaded Peru and conquered the Incas. The Spanish started to make slave raids into northern Mexico.

A.D. 1539-1540: Prehistory ended when Marcos de Niza, Estevan, and Coronado entered the United States Southwest.

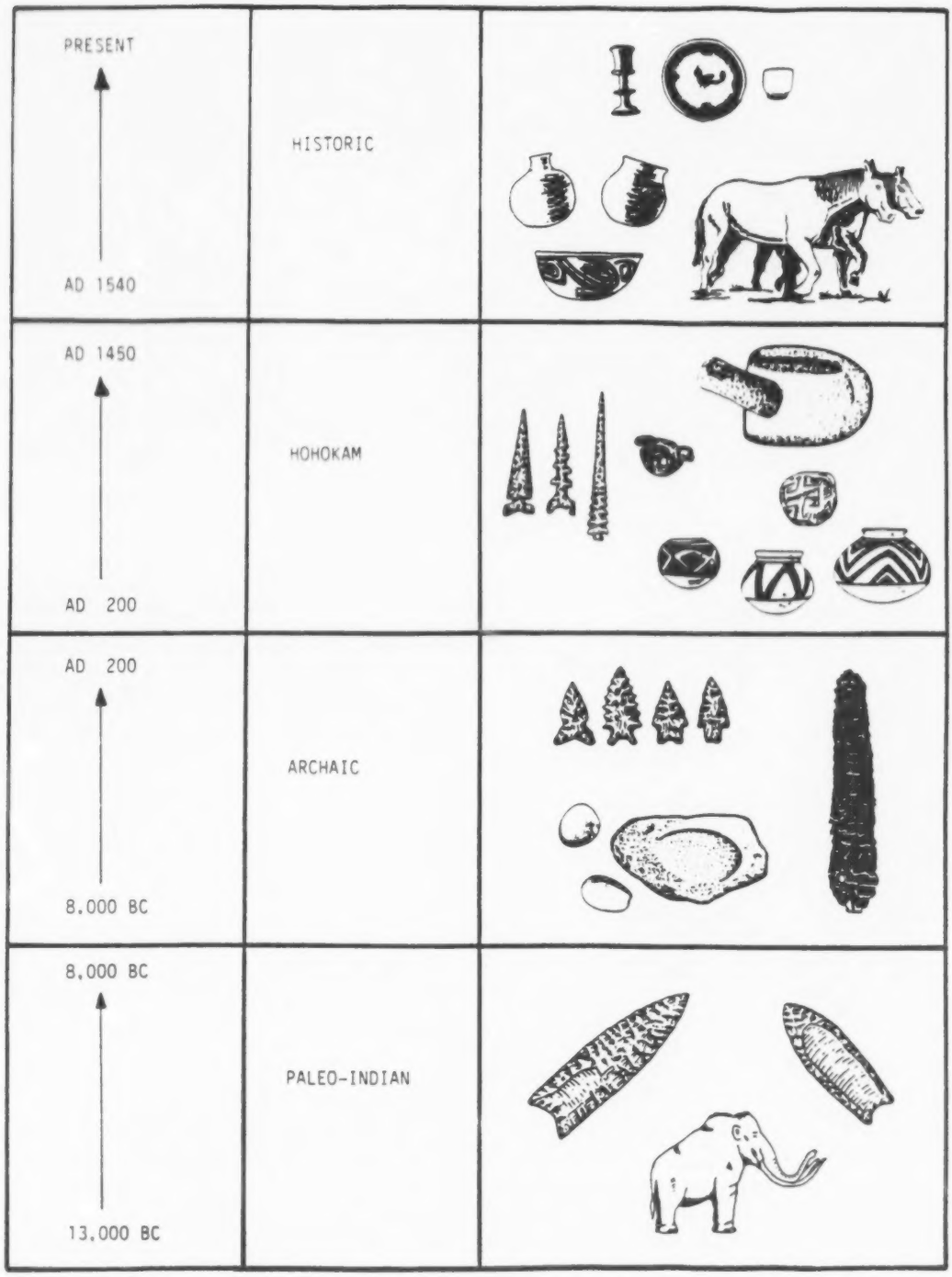


Figure C.a. This chart shows the main periods of southern Arizona's past.

Which period lasted the longest? Which period are we in now?

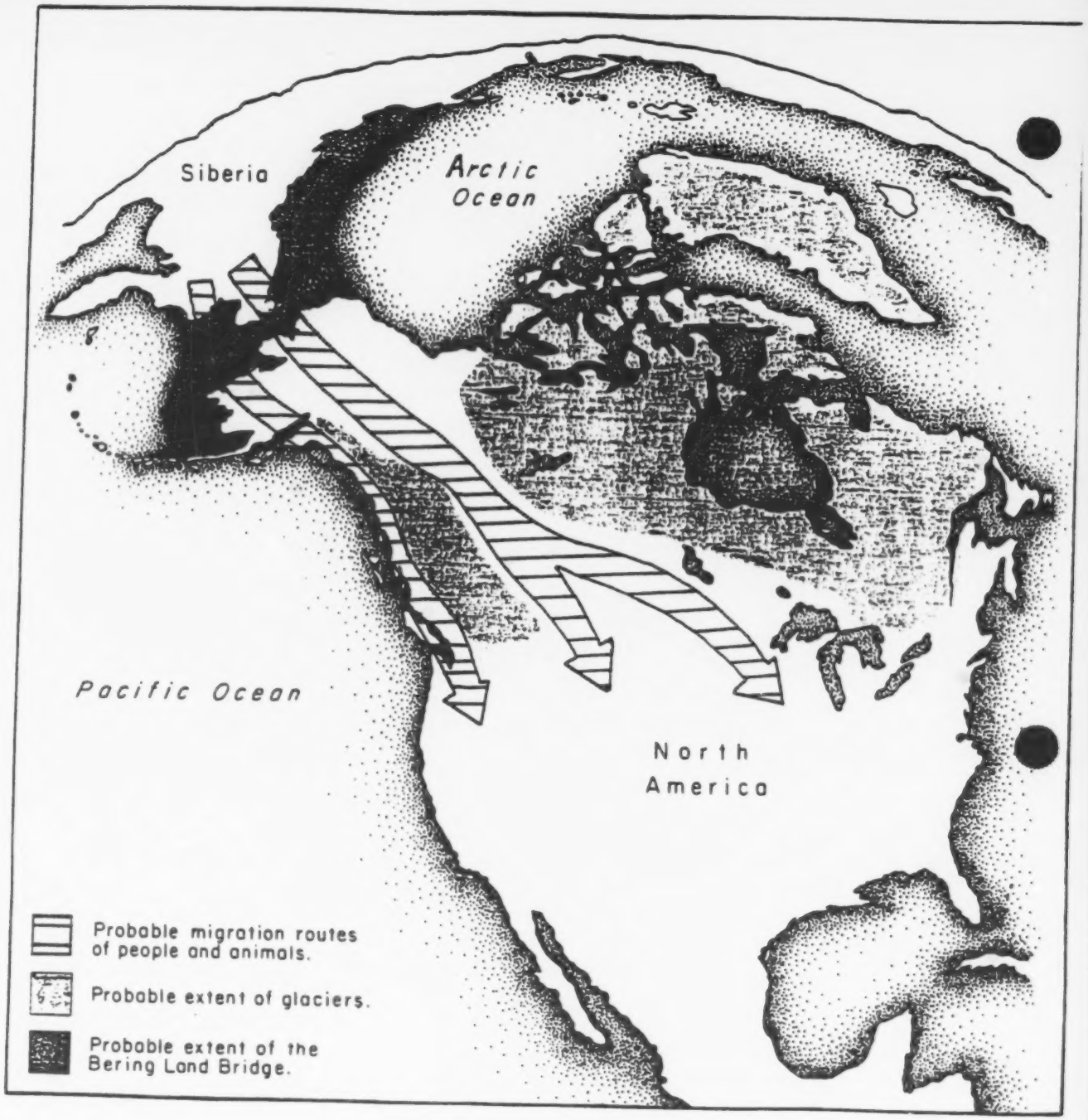


Figure C.b. Across the Bering Land Bridge. People and animals migrated across the Bering Land Bridge at the close of the last Ice Age.
(Adapted from Figure 2.2 in "Origins" by Jesse D. Jennings.)

Where is the Bering Land Bridge now and why?

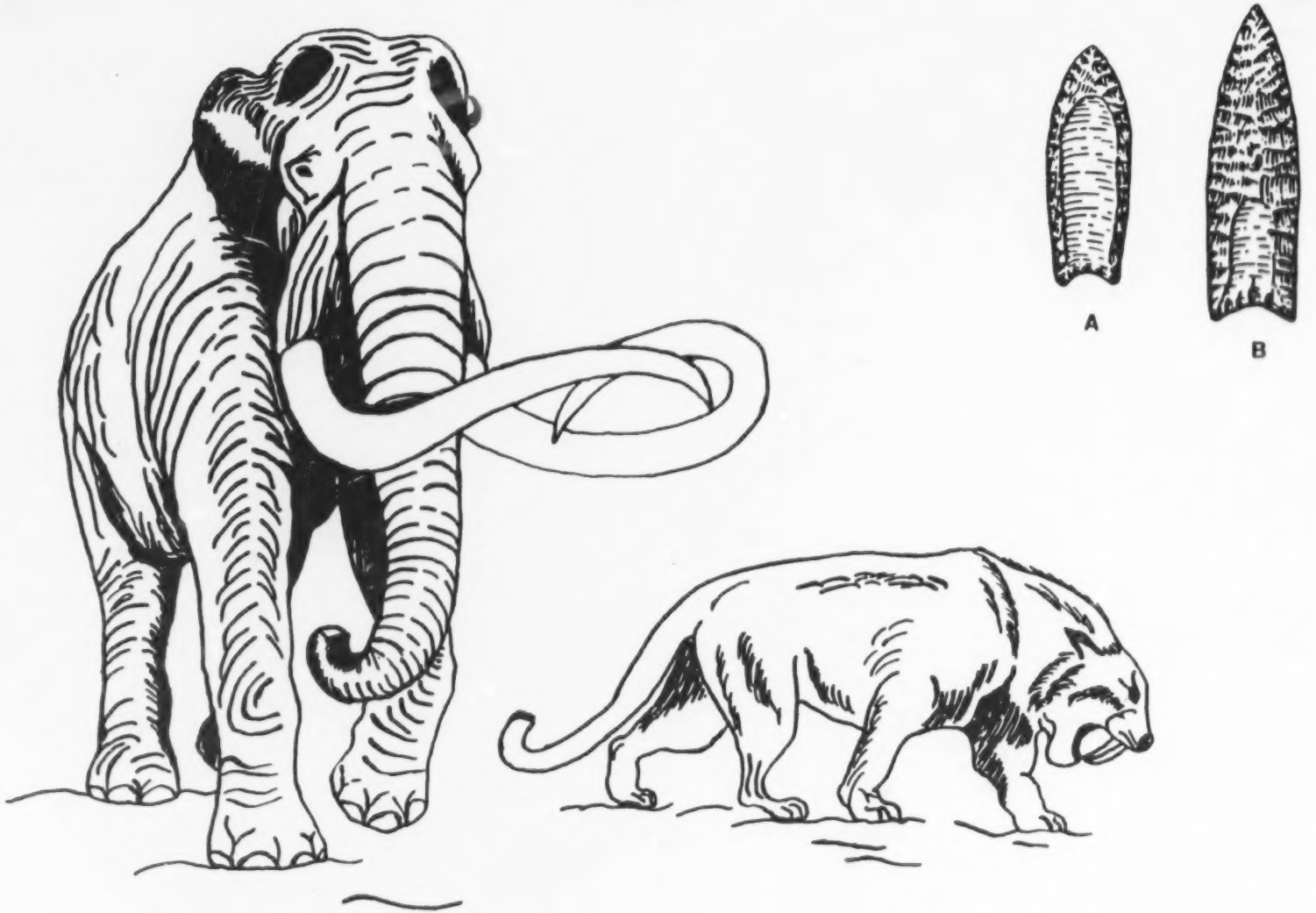


Figure C.c. Mammoths and saber-tooth tigers lived in North America during the Paleo-Indian period. The mammoth shown is a Columbian mammoth. Remains of Columbian mammoths have been found in southern Arizona. Wooly mammoths lived in Canada and Siberia. They did not live in southern Arizona. In some sites, Folsom (A) and Clovis (B) points are found stuck in the mammoth rib bones.
(Projectile point drawings are from ***Making and Using Stone Artifacts*** by Mark C. Slaughter, Lee Fratt, and Kirk Anderson.)

What kind of environment did these large animals live in?

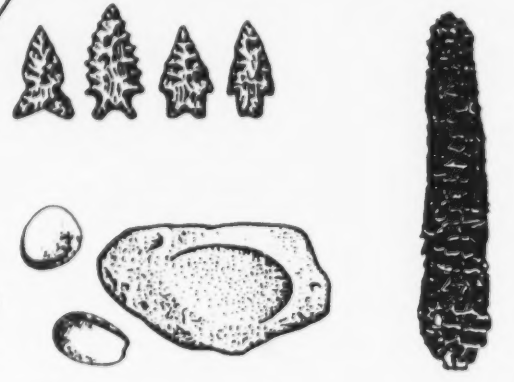


Figure C.d. Archaic period village. During the Archaic period, the people in southern Arizona began to grow corn and to use manos and basin metates to grind up the corn and wild plant foods. The Archaic period projectile points are smaller than the projectile points made during the Paleo-Indian period. (Drawings of the projectile points, manos, and metate are from *Making and Using Stone Artifacts* by Mark C. Slaughter, Lee Fratt, and Kirk Anderson.)

What kind of animals did the Archaic period people hunt?

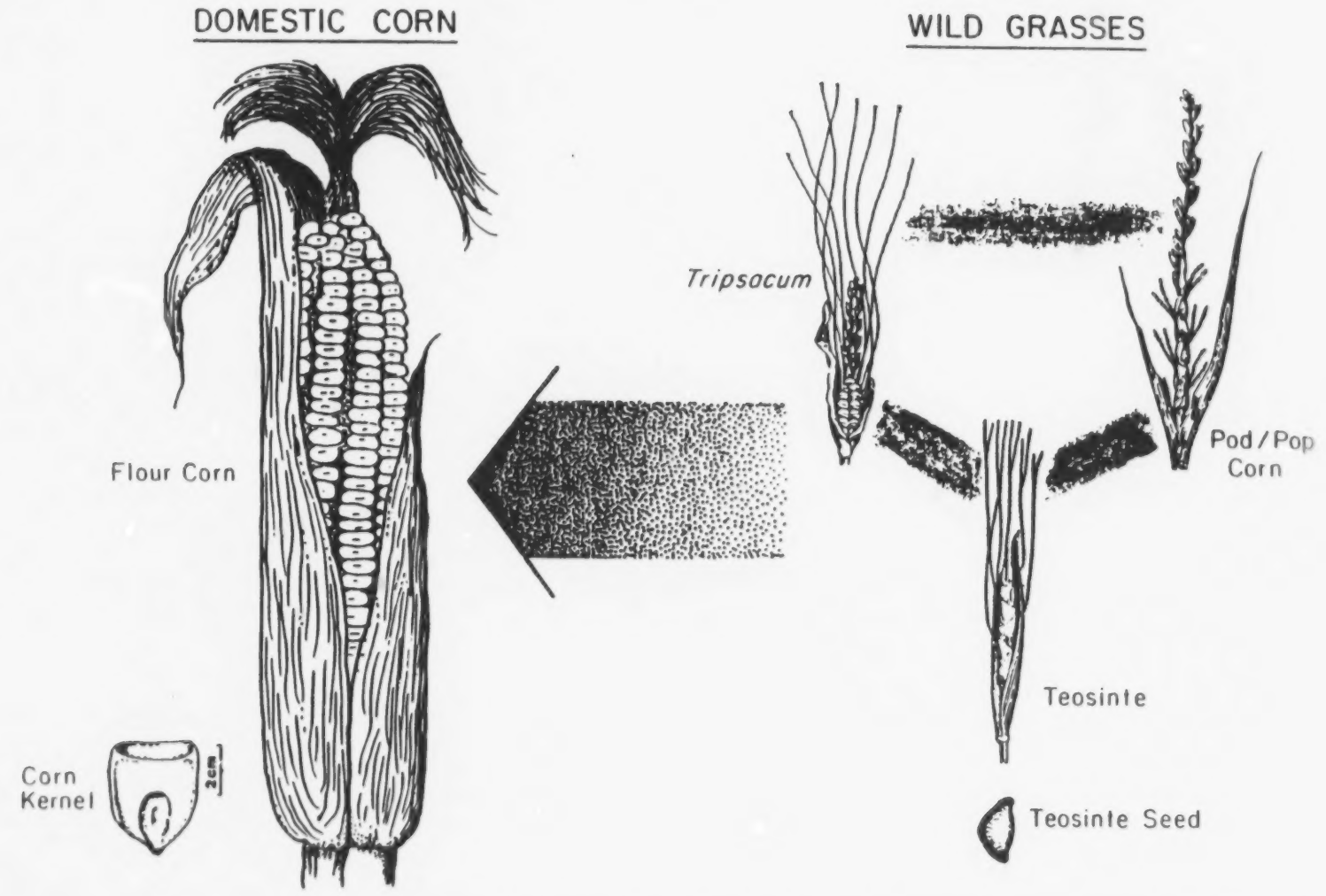


Figure C.e. The development of domestic corn. During the Archaic period, people selectively cross-pollinated three kinds of wild grasses to produce domestic corn. Domestic corn kernels are larger and yield more food than the seeds of teosinte.
(Adapted from Figure 5.7 in Prehistory of the Southwest by Linda S. Cordell and an illustration in "The Origins of New World Civilization" by Richard S. McNeish.)

Where and when was corn (maize) first domesticated?

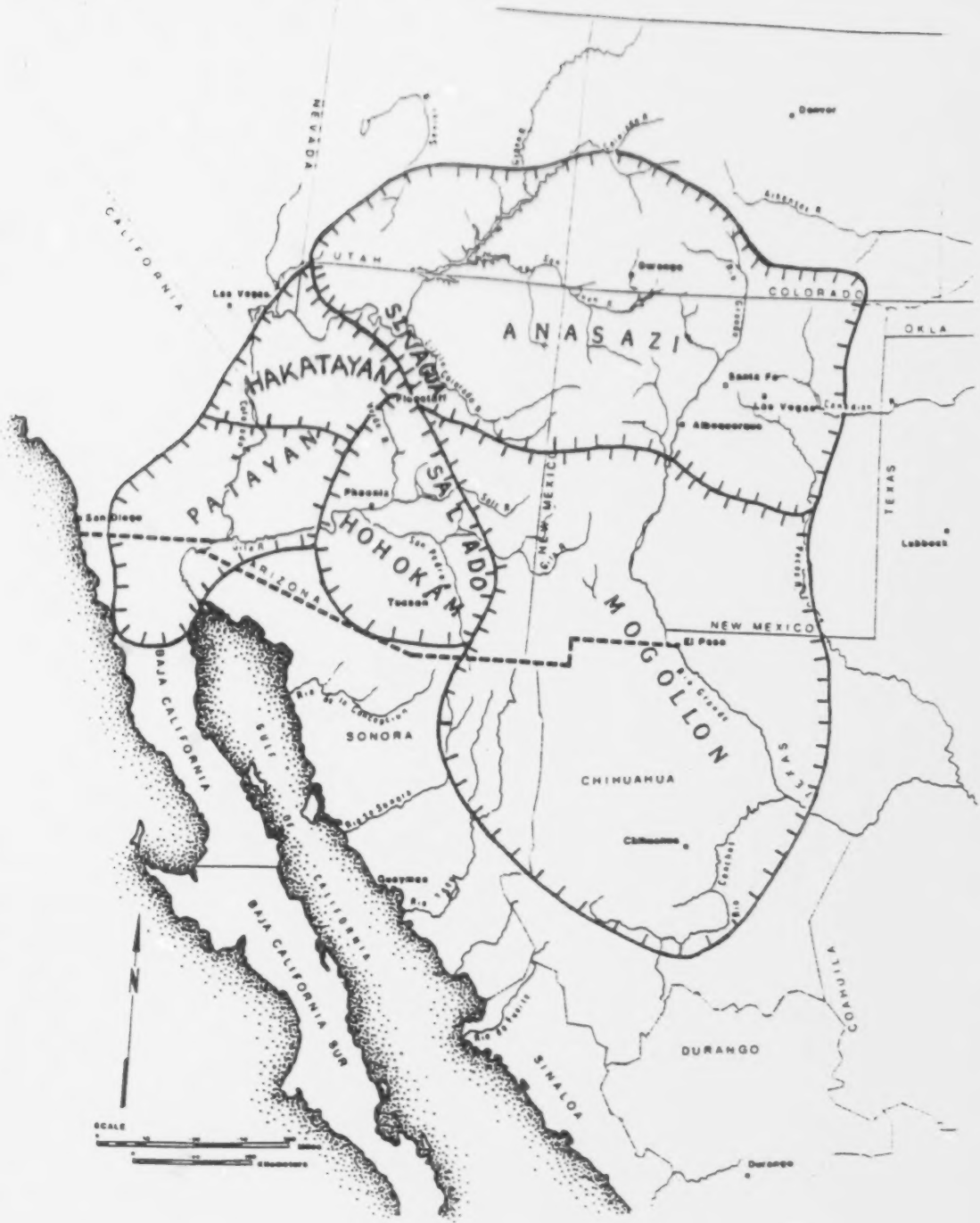


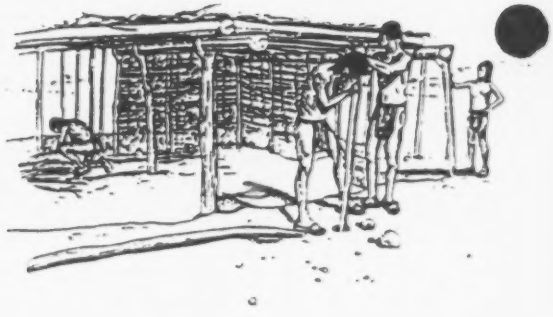
Figure C.f. Location of the major Southwestern prehistoric cultures.
(Adapted from Figure 1.5 in Prehistory of the Southwest by Linda S. Cordell.)

What modern city is at the northern boundary of the Hohokam? What states have prehistoric Anasazi sites?

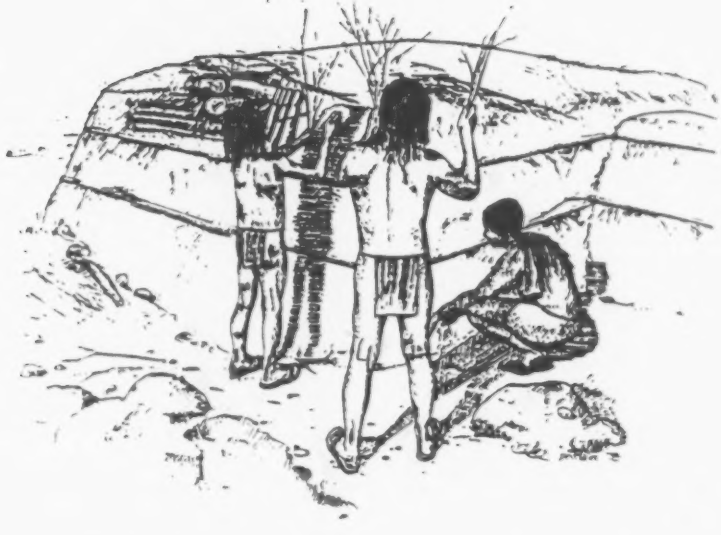
Figure C.g. Hohokam village life. The Hohokam people made beautiful red-on-brown painted pots, carved stone figures like the bird, and incised shell. They also made thin, serrated projectile points, and ground corn and other things with manos and trough metates.
(Illustration modified from original drawings by R. Brittain for the Hohokam pit house exhibit at Fort Lowell Park in Tucson, Arizona. Drawings of the projectile points, mano, and metate are from Making and Using Stone Artifacts by Mark C. Slaughter, Lee Fratt, and Kirk Anderson.)

What Hohokam village activities are shown in the illustration? What artifacts and features would be left for an archaeologist to find?

STEP 1: Plastering the Floor



STEP 2: Building the Frame



STEP 3: Thatching and Placing Adobe on the Roof and Sides of the Pithouse

Figure C.h. Steps in building a Hohokam pit house. Archaeologists have reconstructed how the Hohokam people probably built their pit houses by excavating and studying the remains of many such houses.
(Original drawing done by R. Brittain for the Hohokam pit house exhibit at Fort Lowell Park in Tucson, Arizona.)

What parts of the pit house last the longest and are most likely to be found by archaeologists?

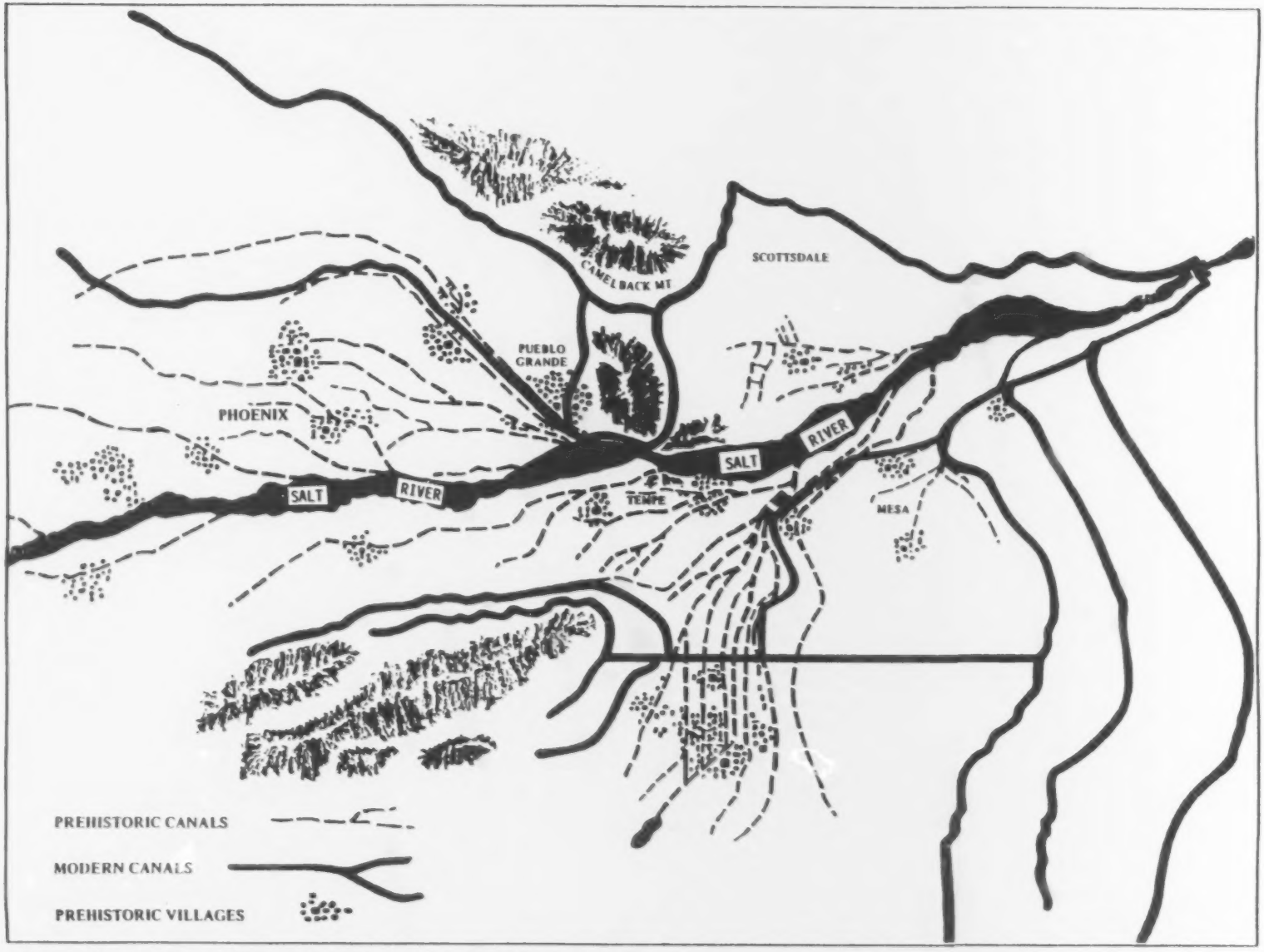


Figure C.1. Hohokam villages and canals in the Phoenix Basin. Modern irrigation canals also are shown. The Phoenix Basin Hohokam built a larger system of irrigation canals than the Tucson Basin Hohokam.
(From *Gift from the Hohokam,* published by the Salt River Project.)

What major river in the Phoenix Basin supplied water to the Hohokam canals?

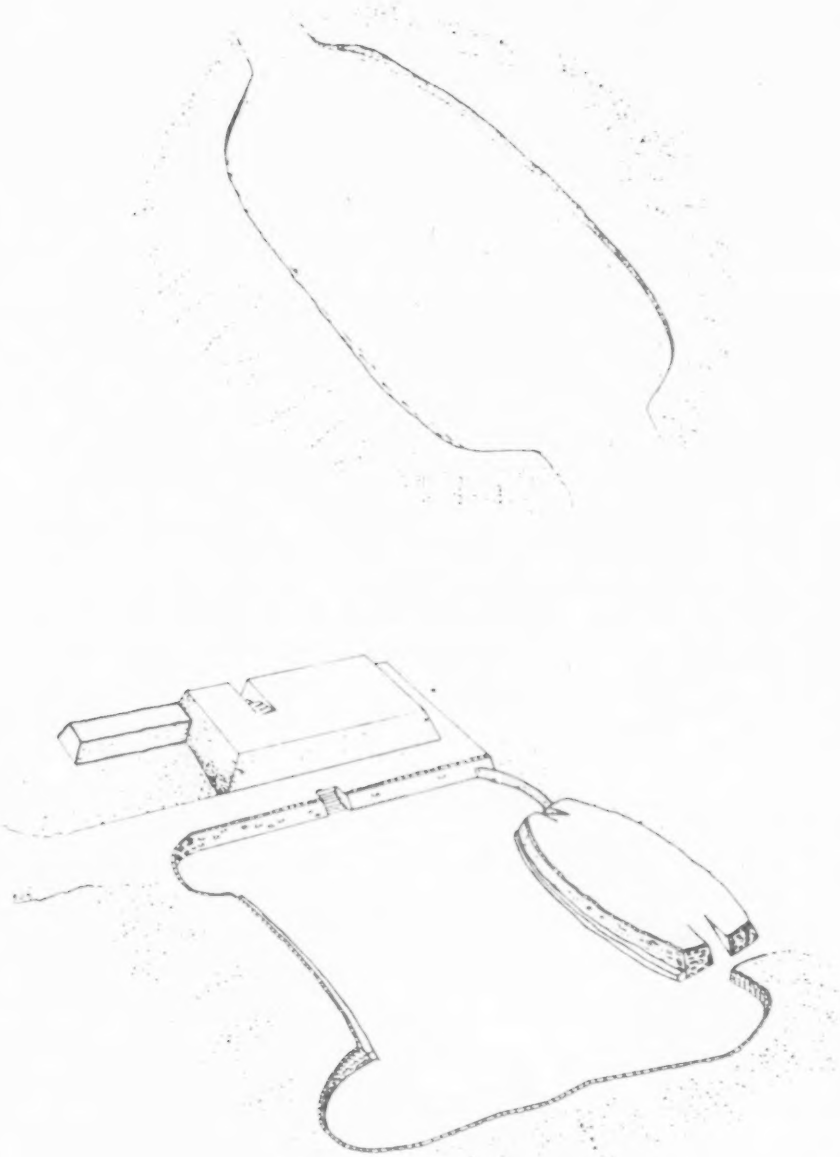


Figure C.j. Comparison between a Hohokam ball court (top) and the Mesoamerican style ball court at Casas Grandes in Chihuahua, Mexico (bottom). Archaeologists do not know exactly what Hohokam ball courts were used for but they may have been for ball games or dances. (From pg. 26 of *Hohokam Indians of the Tucson Basin* by Linda M. Gregonis and Karl J. Reinhard.)

Where do archaeologists think that ball courts came from? Why do some archaeologists think that Hohokam ball courts may have been used for dancing?

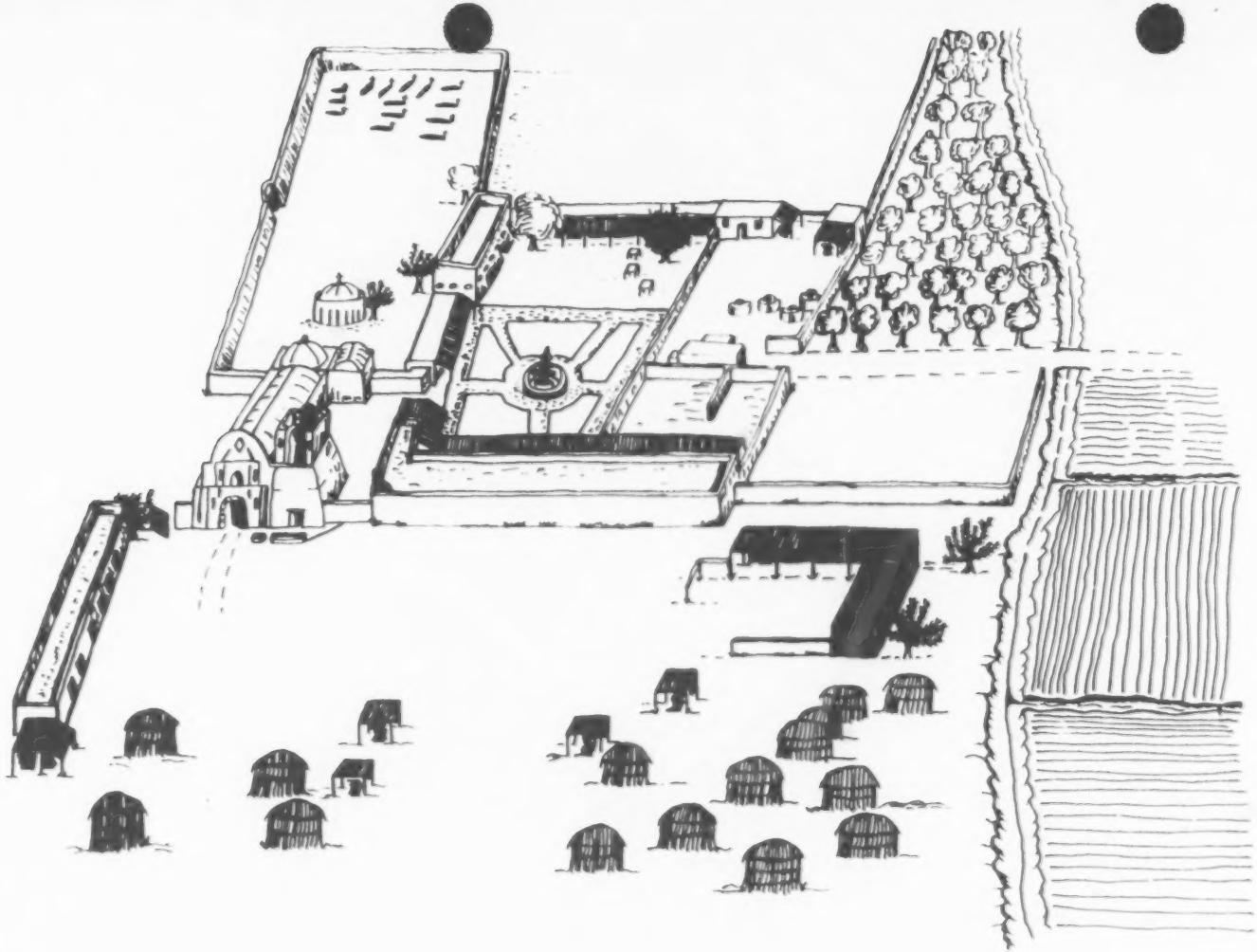


Figure C.k. A Spanish mission community. In the 1700s, many Spanish missions were built in southern Arizona. This drawing shows what Tumacacori Mission may have looked like. The Spanish brought many new things with them including glazed pottery, metal objects such as the chalice and horseshoes, and domestic animals such as horses.

Why is the arrival of the Spanish considered to be the beginning of the historic period in southern Arizona?

Figure C.I. Location of historic Indian tribes in the Southwest. (From ***Southwest,*** edited by Alfonso Ortiz, Handbook of North American Indians.)

What tribes now live in the area where the prehistoric Hohokam Indians lived? How many modern Indian groups are descended from the prehistoric Anasazi culture? Can you name these Anasazi descendants? Where did the Navajo and Apache people come from?

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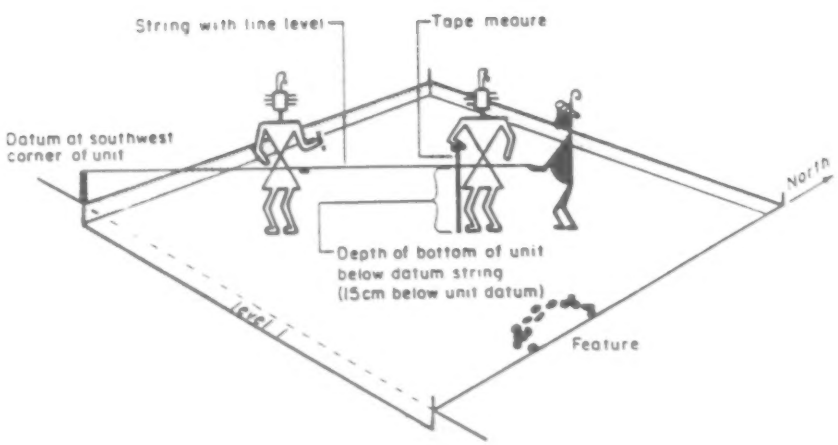
SECTION D

TEACHING ARCHAEOLOGY


String with line level
Tape measure
Datum at southwest corner of unit
North
Depth of bottom of unit below datum string (15cm below unit datum)
level I
Feature

Measuring the bottom of level I using a line level and string after excavating.

Say the word "archaeology" and the image that arises is of people digging up artifacts. But digging is actually only a small part of what archaeologists do. In this section, we discuss some of the aspects of archaeological research that we think are important for students to understand and that de-emphasize digging. Our purpose is not to present an exhaustive discussion of archaeological theory or to present a curriculum. Instead, we hope to foster a deeper understanding of the nature of archaeological inquiry and to emphasize archaeology as a research endeavor rather than an activity that consists of people digging stuff up.

Archaeology provides a fascinating window through which to glimpse a part of our past and of our country's heritage that is still largely unknown. Many of the gaps in prehistory, such as the reason for the abandonment of large sites throughout the Southwest in the fifteenth century, still exist. And we have added new mysteries, such as the effects of disease, to the old. Archaeology is also an effective way to teach students many of the core curriculum requirements, including reading and mathematics, science, problem solving, citizenship and cooperation, geography, art, history, and perhaps most importantly--critical thinking and analysis.

ARCHAEOLOGY AND CULTURE

As digging is the activity most often associated with archaeology, the excavated artifacts are what most people see, whether the artifacts are in museums, in books, or on film. As a result, people may think that the main goal of archaeology is to get artifacts. But most of the work of archaeology is done in the **laboratory,** in the **library,** and at the **typewriter** or **computer.** Although it is great fun to find artifacts, they are only the means to an end for the archaeologist. Artifacts are the clues or building blocks that allow archaeologists to reconstruct past events, explain those events, and understand how and why cultures change. As one archaeologist describes it, the **real** business of archaeology is finding out something about the **people** who lived in the past and their **culture.**

Culture is a very difficult concept to define, even for anthropologists who study it. In this manual, we have defined culture as the material, social organization, and customs of a particular group of people. Another definition for culture is the set of learned beliefs, values, and behaviors generally shared by members of a society. Still another definition (from an archaeologist) is the way that the members of a group of people think and believe and live, the tools they make, and the way they do things. Despite the different perspectives that these definitions of culture reflect, anthropologists generally agree that culture is learned, that it is the mechanism by which all people adapt to their environment, that it is constantly changing, and that no two groups of people have exactly the same kind of culture. Anthropology is all about studying the diversity of modern cultures and trying to understand how and why cultures change. Archaeology, as a part of anthropology, extends that study into the past and provides a greater time depth for investigating cultural change.

Artifacts are part of a people's culture and both reflect and determine a culture's ideas, beliefs, and values. Because they study modern cultures, cultural anthropologists can ask the people about their beliefs and values as well as how objects are used and what particular objects and symbols mean. Cultural anthropologists define boundaries between groups of people by noting how different groups of people interact, what language they speak, their religious beliefs, how the people identify themselves (including political boundaries), and the differences in material culture.

Archaeologists, however, must identify the cultures that they study differently. Because they cannot talk with the people whose artifacts they are studying, archaeologists, especially prehistoric archaeologists, must identify different cultures by differences in the material culture that the people left behind. For example, the prehistoric Hohokam, Anasazi, and Mogollon cultures all lived in Arizona at the same time but occupied different parts of the state. Southern Arizona is considered to be the home of the Hohokam because at any given time the kinds of houses and other structures that people built, the style of pottery, chipped stone tools, and ground stone tools that they made, the way that they buried their dead and farmed their crops, and even their diet are similar from site to site.

Of course, there are also differences among Hohokam sites just as there are differences among the houses in a Tucson neighborhood. But in general, Hohokam sites are more similar to each other than they are to Anasazi, Mogollon, or sites of other, contemporary prehistoric cultures in Arizona. Therefore, it is important to remember that sites with different material culture assemblages may have been occupied at the same time.

Certainly, a group's life style, and therefore, their material culture, changes through time. For example, in the Hohokam area, styles of pottery, chipped stone tools, and ground stone tools, as well as types of houses, burial practices, techniques of farming, and diet all change more or less dramatically through time. These changes in Hohokam material culture allow archaeologists to divide the prehistoric period in southern Arizona into smaller units. But despite the changes in material culture, archaeologists can still identify sites that were occupied at different times as Hohokam, Mogollon, or Anasazi because the sites are connected by the same thread--culture.

ARCHAEOLOGY AND SCIENCE

"Science" is a common term in modern American culture. To a physicist, "science" refers to a particular method of investigating the physical world that involves testing hypotheses by manipulating variables under controlled conditions. To a librarian, "library science" has nothing to do with hypothesis testing but refers to a particular course of study and the principles involved in that study. Attitudes toward science also differ widely. Some people think that science is the only way or the best way to get information about ourselves and our world. Other people think that science is an anathema. Recall the bitter dispute over evolution.

As a method of investigating phenomena, science may be separated into three categories: **experimental science**, **historical science**, and **social science**. Experimental science is what physicists, chemists, and some biologists do. It involves confirming results by replication. Hypotheses are not considered to be supported unless results of experiments can be replicated. A group of scientists at the University of Utah recently had some uncomfortable moments when their claims of having produced a cold fusion reaction could not be experimentally replicated.

Historical science is what astronomers and some biologists and geologists do. Hypotheses are confirmed not by experimental replication but by whether the results fit a mathematical model or evidence from the fossil or geological record. Hypothesis testing in historical sciences is less rigorous than in the experimental sciences because it is indirect. Fossil and geological records are often incomplete. And despite the **Principle of Uniformitarianism** that states that the natural processes that occur in the present also occurred in the past, the processes that produced the fossil and geological records cannot be directly observed. In the case of astronomy, hypotheses involving the formation of the universe or the existence and movement of a star or solar system must also be tested indirectly. Archaeology, historical linguistics, and the part of physical anthropology that is concerned with studying human ancestors are also historical sciences.

Social scientists such as sociologists, psychologists, and anthropologists study human behavior. Hypothesis testing in the social sciences relies on statistical models and is the least rigorous of the three categories. Ethical considerations or, in the case of archaeology, the subject of study, greatly restrict or completely eliminate experimental confirmation. Variables are numerous and interconnected and, therefore, virtually impossible to control. Also, human behavior is hard to predict. People do the same things for different reasons or they may do things for reasons of which they are not aware. Social scientists search for patterns of behavior or of material culture reflecting behavior that fits their hypotheses. Despite its less rigorous nature, social scientists do practice science because they test theories linking causes and effects with hypotheses that require physical evidence.

Archaeology, as both a social and historical science, combines the goals of history--to produce a narrative of what happened--with the goals of science--to produce an explanation of what happened. Archaeologists use logical thought systems (**induction** and **deduction**) to evaluate observable, and often quantifiable, data in order to test hypotheses about what happened at a site and why it happened. Archaeologists use patterns of artifacts at particular sites to infer conditions under which particular kinds of behavior occur in order to explain how and why cultures change. For example, the co-occurrence of the remains of domestic crops and of villages that were occupied year-round lead archaeologists to conclude that farming was a necessary condition of permanent village life.

But like historians, archaeologists have found that particular conditions do not always lead to the same result. The conclusions about farming and permanent village life were discarded when additional evidence from sites on lakeshores in central Mexico and along seacoasts in Europe showed that villages occupied year-round could exist without a subsistence based on

farming if there were abundant and varied wild resources available. And in the Southwest, archaeologists are currently debating whether farming necessarily leads to year-round village occupation because the desert climate restricts the distribution of both wild and domestic resources. By evaluating new evidence and rethinking old data, archaeologists have now concluded that the relative abundance and distribution of all resources, both wild and domestic, is more closely associated with whether or not villages are occupied year-round rather than farming alone.

The nature of archaeology as both a historical and social science means that research questions rarely have right or wrong answers. Either there is evidence to support a hypothesis, or there is no evidence to support a hypothesis, or the evidence is ambiguous. Consider the research question "Was corn grown at this site?" and its attendant hypothesis "If corn was grown at this site, I expect to find corn pollen, digging sticks, corn cobs, and grinding tools." If corn pollen, digging sticks, corn cobs, and grinding tools are found at the site, then the hypothesis is supported and the answer to the research question is "Yes, corn was grown at this site." This evidence also supports another inference--that the people who occupied the site ate corn.

But what would happen if after thoroughly sampling the site (sites are rarely completely excavated), no corn pollen, digging sticks, corn kernels, corn cobs, or grinding tools were recovered. This does not mean that the research question and hypothesis are wrong. It only means that there is no evidence to support the hypothesis that corn was grown at the site. Concluding that corn was not grown at the site is an example of using negative evidence to reach a conclusion. Arguing from negative evidence is always tricky in archaeology because the fact that few sites are completely excavated leaves open the possibility that artifacts related to growing corn are present in the unexcavated area. Another problem is the complexity of human-environment relations. Perhaps corn was grown at the site but not in enough quantity or for a long enough time for artifacts to accumulate. Conditions of preservation at the site or of the natural environment when the site was occupied could eliminate any traces of corn pollen. People may have taken all of their tools with them when they abandoned the site.

And what would happen if grinding tools, particularly manos and metates that archaeologists associate specifically with corn grinding, but none of the other expected artifacts were found at the site? This evidence is ambiguous. If the mano and metate have corn residue or corn pollen or wear patterns that can be associated with corn grinding, then you could conclude that corn was processed at the site. But this evidence cannot support the hypothesis that corn was grown at the site because the corn may have been carried to the site from fields located some distance away.

In archaeology, whether hypotheses are accepted or rejected depends on the evidence and how well arguments are crafted from the evidence. Many times the strength of the evidence is overlooked if the argument presented is strong, convincing, and exciting. And evidence may not have to be quantifiable. It is this aspect of archaeology that makes it so effective for teaching analysis and critical-thinking skills. The constraints of right and wrong are minimal. What counts is imagination tempered by logic and a large dose of common sense.

DOING RESEARCH

Because archaeologists are curious about what happened in the past and why it happened, they ask **questions.** The fact that archaeologists do not put trowel to ground without having questions in mind and problems to solve is one of the main differences between archaeologists and pothunters. Of course, another difference is that archaeologists are not interested in artifacts as objects to collect or sell. To an archaeologist, artifacts are important because of the information that they can give about what happened at a site and how people lived in the past. Artifacts are a source of data about the past that is limited only by the analysis techniques available, the archaeologist's questions and inventiveness, and the information about context. Artifacts can tell us nothing about the past without information about their context; that is, where the artifacts were located at the site and with what other artifacts and features they were associated. When archaeologists write notes and make maps of sites, they are preserving context. When pothunters loot sites, they ignore and destroy context.

The questions that archaeologists ask guide their research whether they are identifying and analyzing a group of artifacts in a museum, excavating a site, or surveying a particular area. Therefore, the research questions that an archaeologist asks must be relevant to the artifacts that are being analyzed or the time period, geographical area, or culture that they are investigating. There is an infinite amount of data that can be obtained from artifacts, features, and their context and an infinite number of questions that can be asked about what happened in the past and why it happened. But not all questions are appropriate to research in all areas or at all sites. There are many limitations to the questions that can be asked, including the condition and extent of documentation of a museum assemblage, a site's condition and size, whether the site represents one occupation or several occupations, where the site is located, when it was occupied, and what kinds of artifacts and features are likely to be present.

Because research questions must be relevant to where the archaeologist is working and what kind of sites and artifacts are present, archaeologists must have some knowledge about previous surveys and excavations done in an area as well as information about the particular site under study. This is why surveys and collection and analysis of surface artifacts is done before excavating. These preliminary studies enable the archaeologist to ask more relevant questions or to focus on trying to solve particular problems.

After deciding on the questions to ask or the problem to solve, the archaeologist writes the research questions or problems down on paper and outlines a plan of how to apply the information obtained during excavation or survey to answering the questions or solving the problem. This plan of research is the **research design** and no archaeological work is, or should be, done without it. An example of a research design addressing a question about prehistoric farming is described on page B-3 of Section B: "Doing Archaeology."

The kinds of research questions that archaeologists ask address human behavior or the relations between people and their cultural and natural environment. The data that archaeologists use to answer their research questions consist of observations made on

artifacts, features, and their context. The questions "What will we find?" or "Will we find pottery at the site?" are not good archaeological research questions because they deal with the artifacts and information that will be recovered in the present. The questions do not deal with life in the past. The second question may be turned into an appropriate archaeological research question by asking "What kind of pottery was used at the site"? The rephrased question now deals with past behavior (pottery use) at the site. By answering this question, information can now be obtained about the activity at the site, when the site was occupied, by whom (which prehistoric culture) it was occupied, and whether or not the people had contact with other people.

Because of the kind of data that archaeologists work with, some questions are easier to research than others. For example, questions about religious beliefs, social and political organization, or motivations for action such as going to war are very difficult, though not impossible, to research using archaeological data. Historians and cultural anthropologists can research these kinds of questions more easily because written documents or the people themselves are available.

On the other hand, archaeologists often can obtain information about daily life or how groups of people adapted to and used their environment more easily than historians. People usually don't write descriptions of what they ate or how they made something. But by studying the remains of discarded food or by replicating how something was made, archaeologists can get information about these activities.

BEFORE DOING ARCHAEOLOGY

Although archaeologists have learned a lot about the prehistoric people in Arizona and elsewhere in the United States, there is even more that we don't know. And as our knowledge increases and our excavation and analysis techniques change, the questions that we ask, and hope to answer, about the past also change. And there are many more questions that archaeologists have not yet thought of.

The questions that archaeologists ask guide their research. Questions about whether there was warfare between the Phoenix Basin and the Tucson Basin Hohokam, the kinds of diseases that were present before the Europeans arrived, whether the Hohokam are the ancestors of the O'oodham (Papago and Pima people), and whether the Hohokam entered the Southwest from Mexico or represent an indigenous Archaic population that was influenced by Mesoamerican culture guide research at the **regional** or **cultural** level. At these levels, archaeologists study patterns of data by comparing and contrasting artifact assemblages and features from several sites. At the cultural level, sites of one culture are compared to sites of another culture. For example, questions about the complexity of Hohokam society and whether or not the Hohokam had hereditary chiefs are debated by comparing Hohokam culture to the Gran Chichimecan culture at Casas Grandes in Chihuahua, Mexico, or to the Anasazi and modern Pueblo cultures in northern Arizona and New Mexico.

At the regional level, the sites studied all occur in a specific physiographic area, such as along a river or in an area drained by a particular group of streams. The archaeological research done in association with the Central Arizona Project (CAP) showed that many of the differences, especially the extent of the canal systems, between the Hohokam who lived in the Phoenix Basin and the Hohokam who lived in the Tucson Basin is related to differences between the physiography of the Salt River and the Santa Cruz River.

Archaeologists also ask questions and conduct research at the **site** and **artifact** levels. At the site level, archaeologists study the artifact assemblage and features present to determine what happened at the site and how the people at that particular site lived. There are research questions that archaeologists investigate at every site. Some of these questions are:

Who lived there?
When was the site occupied and abandoned?
Why did people live at that location?
What did the people eat?
How did they get their food?
Why did they leave the site?

Archaeologists often have information about these questions from excavating and studying other sites (that is, for the regional or cultural levels). Then why should we continue to ask these questions? Think about the houses in your neighborhood. Are they all the same? Are the families that live in them the same size? Does everyone eat the same kinds of food, drive the same kinds of cars, own the same number of televisions? Does every family own a pet? Just as studying different households gives a more complete picture of a neighborhood and a deeper understanding of modern American culture, studying food remains, architectural techniques, and pottery types from several Hohokam pit houses in different sites gives a more detailed picture of Hohokam culture and lifeways, especially the range of variation and the common threads running through Hohokam life. Each site provides some new information about how the people who occupied that particular site adapted to their surroundings and made a living.

Artifacts and features are the basic components of archaeological research. They provide information about technological organization and how people interact with and manipulate their environment. Artifacts and features can also give information about beliefs and values. The presence of elaborately decorated pots suggest that workmanship or artistic skill was valued. As with the site level, there are several research questions that archaeologists always ask regarding the artifacts and features that they find. Some of these questions are:

What type of material was used to make the artifact?
How was the material obtained?
What was the artifact used for?
Was it reused or repaired?
Was the artifact made locally or was it made somewhere else?
Why was the artifact discarded?
Why are there different styles of the same type of artifact?

Although it seems logical that archaeological research would progress from the individual artifacts and features to the site to the region and finally, to the culture, this often does not happen. Like other kinds of research, archaeological inquiry is messy. Many times, research at the cultural level (for example, the adoption of domestic corn) leads the archaeologist to investigate the attributes or characteristics of specific artifacts (for example, the microscopic use-wear on mano and metate grinding surfaces). Whether you go from the cultural level to the artifact level, or vice versa, the important thing is to make sure that the inferences connecting the data to past events and behavior are strong.

Because artifacts are the building blocks of archaeological research, it is very important to be familiar with the basic types of artifacts before excavating or doing other kinds of archaeological research. The basic types of Hohokam artifacts are these:

Ceramics (pottery) are made of fired clay. The interior and exterior surfaces may be decorated with red paint or slip. If the vessel is undecorated, the type is called plain ware. In general, archaeologists associate plain ware pottery with tasks such as cooking food, storing food and other things, and getting water. Decorated pottery is associated with serving food or special occasions such as ceremonies. Despite these general categories of use, the archaeologist relies primarily on the kind of wear on the pottery vessel or sherd to make statements about how the pots were used. For example, scratches on the inside surface may be from ladles and indicate that the pot was used to serve food or water. Soot on the outside surfaces may indicate that the pot was used over a fire to cook food.

Sometimes it is difficult to identify a pot sherd from a thin piece of rock. Most potsherds are curved and have roughly smoothed to very smooth surfaces compared to the surface of a rock. Also, the surfaces of the potsherds often differ in color and texture from the inside, or paste.

It is very difficult to identify what kind of vessel (jar, bowl, or plate) a potsherd is from unless the sherd is from the top, or mouth, of the vessel. Archaeologists call these types of sherds "rim sherds." Rim sherds differ from body sherds by having one edge that is rounded and smooth. All of the edges of body sherds are jagged. Another clue to whether a sherd is from a bowl or a jar is the location of decoration. Bowls can be decorated on the inside and outside surface. Jars have decoration on the outside surface. (One exception is that the inside surface of the mouth and shoulder of a jar also can be decorated.)

Chipped stone artifacts are usually made of fine-grained rocks like obsidian or chert. Chipped stone tools such as scrapers, drills, projectile points (arrowheads and spear points), and knives and the flakes that result from manufacture have sharp edges and sharp ridges. These sharp edges and ridges are formed when the rock (core) is struck with another rock (hammerstone) or a piece of antler.

It is very tempting to identify any triangular shaped piece of chipped stone as a projectile point or arrowhead. This is a problem because the flakes that are struck off of a tool during manufacture are often triangular shaped. The difference between a

triangular shaped flake and a projectile point is in the amount of shaping. Projectile points are always shaped on both sides and the edges show many tiny flake scars from being forced off (pressure-flaked) with an antler tine.

Ground stone artifacts are usually made of medium- or coarse-grained rocks such as sandstone, granite, quartzite, or vesicular basalt. The distinctive characteristic of ground stone tools is their large, smooth surfaces. The term "ground stone" refers to the use of these tools for grinding or pulverizing material such as corn into flour or paint pigment into powder. Manos and metates, grinding stones and handstones, mortars and pestles are all ground stone tools that were used to grind things. Stones axes, bowls, and palettes are tools with surfaces that have been smoothed and shaped by grinding.

Charcoal is burned wood. In southern Arizona, wood is usually not preserved unless it has been burned. Charcoal is a very important artifact because it often can be dated by radio-carbon dating or dendrochronology. A site with a lot of charcoal around house floors or other structure remains may indicate that one or more structures burned down. But this interpretation must be carefully considered because brush fires that also burn extensive areas of sites are common in southern Arizona.

Shell was used by the Hohokam for jewelry and other ornaments. Shell may be unworked or cut and ground to make bracelets, earrings, noseplugs, or necklace beads. Sometimes it is difficult to identify shell from white chert or burned shell from burned bone. Look for differences in texture between the surface and the inside of the shell. Chert usually does not show differences between surfaces. The inside of bone is porous and spongy looking compared to shell that is not as porous.

Animal and human bone is found on Hohokam sites. Bone may be identified by its porous and spongy looking interior. Bone may be burned or unburned. Be careful--unburned bone is not necessarily white. It may be stained brown depending on the kind of soil at the site. Bone buried in trash pits that have a lot of ash or charcoal may be stained black. Cremated bone is so heavily burned that it often turns grayish-blue.

Just because there is animal bone on a site doesn't mean that the animal was used for food. The Hohokam did eat rodents, especially rabbits. But rodents also burrow into sites and other animals such as coyotes may die on a site. This is where context and detailed observation of an artifact are very important. In order to identify the animals that people ate, archaeologists look for characteristics such as butchering marks or an assemblage of bones that are from the meaty part of the animal (for example, limb bones from haunches, rib bones).

Plant remains that have been burned or buried in mud that hardened and formed a caste of the plant are also found on sites. Burned corn cobs and mesquite beans have been recovered from Hohokam sites. The imprints of corn cobs and of brush and wood in clay or adobe have also been found on Hohokam sites.

Besides identifying artifacts, it is also good to be familiar with the basic techniques of excavation before starting work at a site. Mapping may be practiced by laying out grids with masking tape and placing objects inside the grids. Line levels may be attached to chairs or to wooden stakes in sandbox digs for use in measuring the ground surface and the depth of the excavation. It is important to note that once a line level is set up, it must not be removed until the excavation is over. Moving the line level changes the measurements. Also note that as you excavate down below the starting point (ground surface), the measurements increase.

Archaeologists excavate with the edges of trowels. The points are used when soil is very hard and compact. But this is a technique that requires care and experience so as not to damage any artifacts. Always brush away dirt with a whisk broom in one direction. Brushing the whisk broom back and forth only moves the soil back and forth across the area that you are clearing. Practicing these techniques before excavating will make the dig go more smoothly.

AFTER DOING ARCHAEOLOGY

You have learned something about archaeology and may have had the chance to participate in an excavation. What are your responsibilities now? We think that teaching archaeology serves two important purposes. One purpose is to help teach core curriculum skills and to show how those skills are used and integrated in the professional world of work. If you can't read, do math, or analyze data and think critically, you can't be an archaeologist, or any other kind of scientist.

The other purpose is to foster a preservation ethic and an awareness and appreciation for other cultures and other times. American society is highly complex, extremely fast-paced, and filled with amazing technological achievements. It is very easy to develop an ethnocentric view and to forget that the achievements of modern society have a long history. Archaeology help to bring back an awareness that people in all cultures and during all times used their ingenuity to solve their problems and enrich their lives.

The remains of those people — our cultural heritage — are disappearing at a tremendous rate due to vandalism (intentional and unintentional), development, and neglect. To an archaeologist, there are few things worse than walking over a site — a mystery of history — and coming upon gaping potholes ringed with broken artifacts and (usually human) bones and filled with beer cans and potato chip bags. By learning about archaeology and about how archaeologists do research, we hope to increase awareness of the importance of preserving our heritage for future generations. Archaeologists cannot do this alone. They must have help. Education is our greatest hope for ensuring that the material culture record of the past is still around for the future.

SECTION E

PROTECTING OUR HERITAGE

A · THIEF
OF · TIME

Since the time of the Egyptian pharaohs people have been interested in collecting things from the past. Collecting and keeping "treasures" — a rock, a shell, a potsherd--are part of human nature. But archaeologists believe that all of us have a responsibility to protect the remains of the past, and not to collect them for our own, personal use. For the last hundred years,people in the United States have been working to preserve archaeological sites and artifacts for everyone.

In 1891, a Swede named Baron Gustaf Eric Adolf Nordenskiold went to Mesa Verde, Colorado, to see the mysterious cliff dwellings that had been discovered there. Instead of just sightseeing, he spent the summer digging in the ruins and collecting a huge number of artifacts. When the summer was over, he decided to ship the material home to Sweden. He went to Durango, Colorado, where he tried to ship the artifacts, but people there tried to stop him. There were no laws to prevent Baron Nordenskiold from keeping the artifacts, so his collection was sent to Europe. Today, the artifacts he collected are in the National Museum in Helsinki, Finland.

Because of this and other, similar incidents, people in Colorado lobbied to have a law passed that would protect their archaeological remains. And they succeeded. The 1906 Antiquities Act was written to protect archaeological sites on federal land and to allow only professional archaeologists to excavate those sites. Several other laws have been passed since then, including the 1979 Archaeological Resources Protection Act, which is meant to stop the "mining [pothunting] of archaeological sites on public land for individual profit" [Figure E.a.].

Arizona has a state antiquities act that makes it illegal to damage prehistoric or historic sites on state land or to excavate a site without getting a permit. Permits are only given to professional archaeologists. It is also illegal in this state to buy and sell artifacts unless one can prove that they came from private land and that a person legally owned the artifact. In 1990, other laws were passed that make it illegal to buy and sell any object taken from a burial, or to disturb burials on any kind of land, whether public or private.

Unfortunately, some unscrupulous people will pay a lot of money to own a piece of the past. And there are pothunters who dig into sites to supply those artifacts or to keep the artifacts for themselves. Pothunters often destroy sites, because they pay no attention to provenience as they dig through houses and into burials looking for "treasures."

Archaeological laws are meant primarily for pothunters, but we all have a responsibility to protect the past. <u>If you find a site, you must not take any artifacts home with you.</u> It's okay to look at the artifacts, but you should take only notes and pictures with you. An interesting artifact picked up and taken away while hiking may prevent archaeologists from learning important information about the site such as when it was occupied, which group of people lived there, and what the site was used for.

By taking notes and pictures and finding the location of the site on a map, you can help to preserve a site. You can give your information to the nearest university, museum, or land managing agency (the U.S. Forest Service, the U.S. Bureau of Land Management, the National Park Service, the State Land Department, or city or county agencies). And you also can report evidence of vandalism and looting at a site to those same places.

SITE STEWARDS

Arizona has a Site Steward Program that is helping land managers protect sites throughout the state. In this program, volunteers are trained to survey for sites, record sites, and to monitor (observe and make a record of) the condition of sites. If they find a site that has been vandalized, or if they see pothunters, they alert land managers, who will then investigate the damage. The volunteers, called Site Stewards, spend at least one day a month helping to protect sites.

For more information on the Site Steward Program, contact Site Steward Program Coordinator, State Historic Preservation Office, Arizona State Parks, 800 W. Washington St, Suite 415, Phoenix, AZ 85007, or call 602-542-4174.

FEDERAL, STATE, AND PIMA COUNTY LAWS

As the United States has grown and the wilderness has shrunk, the destruction of archaeological and historic sites has increased at an alarming rate. Since the 1960's concerned citizens and professional archaeologists have worked together to pass several federal, state, and local laws that protect archaeological and historic sites. Some of these laws (such as the 1906 and 1979 Acts) are designed to help stop the destruction of archaeological sites by making unauthorized excavation of sites on public (federal, state, county, and city) land illegal. These laws impose fines and jail sentences. Other laws (such as the 1966 and 1969 Acts) give guidelines on how to treat archaeological and historic sites on public land once they are found. An important part of these laws is to help preserve archaeological sites and our nation's historical heritage for the future. The importance of burials and the need to respect all human remains regardless of their age or ethnic or cultural group is expressed in Arizona's 1990 burial law.

Federal Laws:

1906 Antiquities Act: Protects archaeological resources on federal land; authorizes scientific excavation on lands owned or controlled by the United States by qualified researchers; establishes penalties (fines) for unauthorized excavation on federal land.

1935 Historic Sites Act: Calls for preservation of properties that have national, historical, or archaeological significance. Also calls for government agencies, such as the Forest Service and the Park Service, to cooperate in order to protect archaeological and historical sites.

Reservoir Salvage Act of 1960: Calls for the preservation of historical and archaeological sites that would be lost to dam construction. Requires archaeological survey before dam construction. This was an important law because it focuses attention on the many hundreds of archaeological sites that are permanently buried under water when a dam is constructed.

National Historic Preservation Act of 1966: Enlarged the National Register of Historic Places to include properties of state and local significance and established the Advisory Council on Historic Preservation. The Advisory Council establishes guidelines for entering sites on the National Register. The Council also assists state and local governments to write their own laws protecting archaeolgical and historic sites.

National Environmental Policy Act of 1969: Includes archaeological sites as important environmental resources that require protection. The act requires anyone doing work on federal land or work involving federal funds to develop an environmental impact statement.

Archaeological Resources Protection Act of 1979: Strengthens the 1906 Antiquities Act. The 1979 act is designed to halt the vandalism and destruction of archaeological sites on public land by individuals for their own benefit or for profit. It makes unauthorized excavation a felony crime rather than a misdemeanor. This act imposes fines as high as hundreds of thousands of dollars and sentences of several years in jail for people caught vandalizing sites on public land.

State Laws:

Arizona Antiquities Act of 1981: One of the most comprehensive state acts, this law makes it illegal to deface prehistoric, historic, or vertebrate paleontological sites on state owned or state controlled land. The act makes it a felony (up to five years in jail and $150,000 in fines) to knowingly excavate a site on state land without permission. This law also makes it a felony to sell, barter, purchase, or transfer antiquities unless ownership (that is, where the artifact originally came from) is known.

Arizona Historic Preservation Act of 1983: Establishes a historic preservation policy for Arizona and a state historic preservation program.

Arizona Laws Protecting Burials, Sacred Objects, and Objects of Cultural Patrimony: Extends penalties for disturbing or taking remains from burials, including burials on private land. Provides for returning material from burials to groups of people that claim the material as part of their heritage (patrimony).

County Laws:

Pima County: Pima County in southern Arizona has rezoning and planning laws that require consideration of archaeological and historic sites before rezoning. This process includes evaluating the potential for archaeological or historic sites to be present on the property. If sites are found after a survey of the property, plans for their protection must be included in the development plan for the property.

NOTICE
Ancient ruins, archeological resources, fossils, and historical remnants in the vicinity of this notice are fragile and irreplaceable. The Antiquities Act of 1906 and Archeological Resources Protection Act of 1979 protect them for the benefit of all Americans.
ENJOY
BUT DO NOT DESTROY
YOUR AMERICAN HERITAGE
DO NOT DIG, REMOVE, INJURE OR DESTROY ANY HISTORIC OR PREHISTORIC OBJECTS, RUINS, OR SITES.
Violators subject to arrest, a maximum fine of $20,000, and or imprisonment.
United States Department of Agriculture — Forest Service
27-7

Figure E.a. In the National Forest, these signs warn visitors that they are near an archaeological site.
(Courtesy of Mary Ferrell, Coronado National Forest Archeologist, Tucson, Arizona.)

What kind of activity are these signs trying to prevent?

SECTION F

RESOURCES

From A. P. Maudslay, *Biologia Centrali Americana: Archaeology, IV*

BEST COPY AVAILABLE

BOOKS

The list of materials in this section is not exhaustive, but represents resources that we are aware of and think are accessible to interested readers. They include materials that can be used readily by students as well as those that can be used by teachers for their own research and preparation. If you have any good references that you would like to add to our list, please let us know.

Fiction

Bandelier, Adolf F.

1971 The Delight Makers. Harcourt Brace Jovanovich, New York.

An interesting attempt by one of the Southwest's first ethnohistorians to recreate the culture of the late prehistoric Rio Grande peoples. Style is nineteenth-century, but the book is very readable and the reconstruction is fairly accurate even in terms of more recent research. Strong upper-level elementary readers and above.

Hillerman, Tony

1973 Dance Hall of the Dead. Avon Books, New York.
1988 A Thief of Time. Harper & Row, New York.
1989 Talking God. Harper & Row, New York.

These and other Hillerman mysteries make for exciting reading that can be used for good discussions. Dance Hall of the Dead addresses the issue of faking artifacts (not unknown among archaeologists who want to prove a point), Thief of Time takes on the issue of pothunting, and Talking God gets right to the point on the currently "hot" issue of Indian burial goods and repatriation. Upper-level elementary readers and above.

LeGuinn, Ursula K.

1987 Always Coming Home. Bantam Books, New York.

Anthropological, rather than archaeological, this book tells a tale of two cultures through the eyes of a girl with ties to both groups. Includes poems, legends, and art. The original edition (Harper and Row 1985) included a cassette with music of the cultures. Good for discussion of culture contact and change. Strong upper elementary and above.

Macaulay, David

1979 Motel of the Mysteries. Houghton Mifflin, Boston.

A great spoof on the discoveries at Troy and of King Tut's tomb, this book can be used to teach about archaeological interpretation.

Nonfiction

Baldwin, Gordon

1965 The Riddle of the Past: How Archaeological Detectives Solve Prehistoric Puzzles. Norton, New York.

Explains the skills and techniques of archaeological fieldwork and laboratory work that were used in 1965. Tells how amateurs can work with professional archaeologists.

1967 Calendars to the Past: How Science Dates Archaeological Ruins. Norton, New York.

Discusses in understandable terms how information from geology, astronomy, physics, and other sciences can be used to determine the age of archaeological remains.

Bartlett, Michael H., Thomas M. Kolaz, and David A. Gregory

1986 Archaeology in the City: A Hohokam Village in Phoenix, Arizona. University of Arizona Press, Tucson.

Book written for the layperson about the prehistory and archaeology of the Hohokam site of Las Colinas in Phoenix.

Batherman, Muriel

1981 Before Columbus. Houghton Mifflin, Boston.

Summarizes Paleo-Indian and Anasazi (Basketmaker and Pueblo) cultures. Oversimplified, but provides a reasonable introduction to Anasazi archaeology. 2d through 4th grade.

Basso, Keith

The Cibecue Apache.

A detailed but concise description of the Cibecue Apache, including information on their history and prehistory. Good for reference and high level high school.

Bolton, Herbert E.

1984 Rim of Christendom. University of Arizona Press, Tucson. Originally published in 1939.

A classic study of Father Kino, provides a good introduction to Spanish colonial Arizona. Strong elementary readers and above.

1949 Coronado: Knight of Pueblos and Plains. University of New Mexico Press, Albuquerque.

A classic on the topic of Coronado's expedition. Carefully researched and easy to read. Stronge elementary school readers and above.

Brandenberg, Aliki
1976 Corn is Maize: The Gift of the Indians. HarperCollins, New York.

Simple story of the domestication of corn. Illustrations are interesting. Good read-aloud book. 2d through 4th grade.

Bureau of Land Management
1994-95 Project Archaeology. U.S. Department of the Interior, Bureau of Land Management.

The Bureau of Land Management is sponsoring the development of cultural history contexts and teachers' guides on archaeology for all of the western United States. Arizona's culture history context is nearly complete, and the teachers' activity guide is available (Intrigue of the Past: A Teacher's Activity Guide for Fourth Through Seventh Grades, by Shelley J. Smith, Jeanne M. Moe, Kelly A. Letts, and Danielle M. Paterson). Some of the materials and methods of presenting them are simplistic for the intended grade levels. Contact the state Bureau of Land Management Office in Phoenix for more information.

Casson, Lionel, Robert Claiborne, Brian Fagan, and Walter Karp
1977 Mysteries of the Past. American Heritage, New York.

Chapters cover a wide range of topics, from Mound Builders, to early contact in the New World, to the origins of the Indo-Europeans. Good presentations of the data behind the "mysteries." For strong upper-level elementary readers and above.

Cordell, Linda S.
1984 Prehistory of the Southwest. Academic Press, Orlando.

A good, if somewhat technical, overview of the current views on Southwestern prehistory. Terms and concepts are explained; reading level is high school and above.

Coy, Harold
1973 Man Comes to America. Little, Brown, Boston.

Discusses the various theories of early man's arrival in the Americas, settlement, and means of survival. General overview of North American prehistory and good suggestions for further reading. Dates and some concepts may be outdated.

Crown, Patricia L., and W. James Judge
1991 Chaco and Hohokam: Prehistoric Regional Systems in the American Southwest. School of American Research, Santa Fe.

One of several books recently available containing scholarly, synthetic information on the prehistoric Southwest. For high school level, higher-level research.

Deetz, James
1967 Invitation to Archaeology. The Natural History Press, New York.

Scholarly but readable review of archaeology. Includes some advanced concepts that archaeologists use in writing research designs and in artifact analysis. General reference.

1977 In Small Things Forgotten. The Archaeology of Early American Life. Anchor Press/Doubleday, New York.

Scholarly but readable work on historical archaeology. Has some excellent examples of historical archaeological excavations and projects. Demonstrates the difference between prehistoric and historic archaeology. General reference, although some descriptions of excavations and projects could be copied for class handouts for upper elementary classes and older or could be read aloud.

Doelle, William H., and Paul R. Fish
1988 Recent Research on Tucson Basin Prehistory: Proceedings of the Second Tucson Basin Conference. Anthropological Papers No. 10. Institute for American Research, Tucson. Available from Desert Archaeology, Tucson.

A scholarly volume of recent research. Articles vary from extremely readable to technical. Other scholarly works (site reports) are available from Desert Archaeology and from other archaeological contractors in Tucson including SWCA Environmental Consultants, Tierra Right-of-Way Services, Statistical Research, Cultural and Environmental Systems, and Old Pueblo Archaeology.

Dozier, Edward P.
1970 The Pueblo Indians of North America. Waveland Press, Prospect Heights, Ill.

Scholarly but readable description of the Pueblo peoples in northern Arizona and New Mexico written by a Santa Clara Pueblo Indian turned anthropologist. Includes information on Pueblo prehistory and history. Good for reference and high level high school.

Downs, James F.
1972 The Navajo. Case Studies in Cultural Anthropology. Holt, Rinehart, and Winston, New York.

A detailed but concise description of the Navajo, including information on their history and prehistory. Good for reference and high level high school.

English, Sandal
1981 Fruits of the Desert. Arizona Daily Star, Tucson.

Descriptions of and ways to use fruits and nuts of the Sonoran Desert. Also includes information on the various foods. Not as authentic as C. Niethammer's book, but recipes are more familiar to American tastes.

Fagan, Brian M.
1978 In the Beginning: An Introduction to Archaeology. Little, Brown and Company, Boston.

This excellent overview of the field of archaeology is easy to read. Reading level is high school and above.

1985 The Adventure of Archaeology. National Geographic Society, Washington, D.C.

Good, exciting story of the history of archaeology throughout the world. Reading level is high school and above, but sections make good "read-aloud" material for lower grades.

Folsom, Frank
1966 Science and the Secret of Man's Past. Harvey House, Irvington-on-Hudson, New York.

Charts how the development of archaeology has been influenced by scientific discoveries made over the past 300 years. Tells how the work of many scholars has made it possible to date archaeological remains.

1983 America's Ancient Treasures. 3d edition. University of New Mexico Press, Albuquerque.

Profiles nearly 400 archaeological sites and numerous museums that are open to the public. Gives a good general introduction to the prehistory and archaeology of the United States and Canada.

Gregonis, Linda M., and Karl J. Reinhard
1979 Hohokam Indians of the Tucson Basin. University of Arizona Press, Tucson.

A concise look at the prehistory and lifeway of the Hohokam. Designed for readers 6th grade and up.

Grimm, William C.
1973 Indian Harvests. McGraw-Hill, New York.

Describes the ways Indians used many native plants, including cattails and milkweed.

Gronemann, Barbara
1994 Hohokam Arts and Crafts. Southwest Learning Sources, 6440 E. Presidio Road, Scottsdale, Ariz. 85254.

Nicely illustrated, this book contains practical instructions on how to do various Hohokam arts and crafts using modern materials. It also contains background information on the various crafts. Written by a professional educator, all of the instructions and crafts have been tested in the classroom or in children's clubs.

Gumerman, George J.
1991 Exploring the Hohokam: Prehistoric Desert Peoples of the American Southwest. University of New Mexico Press, Albuquerque.

Scholarly volume on various aspects of Hohokam archaeology. Good as research resource.

Haury, Emil W.
1976 The Hohokam, Desert Farmers & Craftsmen: Excavations at Snaketown 1964-1965. University of Arizona Press, Tucson.

Fairly technical, but still the most comprehensive-but-readable volume available on the subject.

Houk, Rose
1987 Casa Grande Ruins National Monument. Southwest Parks and Monuments Association, Tucson.

Written for the layperson, this book contains lively descriptions of the prehistory and archaeology of the Hohokam site of Casa Grande, near Coolidge, Arizona.

1992 Hohokam.
Sinagua.
Mogollon.
Anasazi.
Salado. Southwest Parks and Monuments Association, Tucson.

These inexpensive, 15-page booklets describe the archaeological cultures of the American Southwest in an easy to understand way. Third grade and above.

Jennings, Jesse D. (editor)
1978 Ancient Native Americans. W. H. Freeman, San Francisco.

A scholarly but readable book. Contains good, detailed summaries of major archaeological groups and time periods.

Lattimore, Deborah Nourse
1986 Digging Into the Past. Brainboosters, Educational Insights, Dominguez Hills, California.

Good activity-center book, uses hand-held "decoder" to provide answers to puzzles and logic problems. Mostly Old World archaeology presented. Upper-level elementary through junior-high.

Lewin, Roger
1988 In the Age of Mankind. Smithsonian Institution Press, Washington, D.C.

A coffee table-style book with good illustrations and up-to-date (as of 1988) text on the evolution of primates and early homids. It also contains a chapter on the history of natural sciences and the future of biological research. Strong upper-level elementary and beyond, although pictures will interest most age groups.

Lipetzky, Jerry
1982 DIG 2. Interaction Publishers, Lakeside, California.

A computer-based unit, this also works well without the computer. Has instructions for simulating cultures.

Lister, Robert H., and Florence C.
1983 Those Who Came Before: Southwestern Archaeology and the National Park Service. University of Arizona Press, Tucson.

For the layperson, history of archaeology in the Southwest. Contains excellent illustrations, graphics, and biographies.

Lyttle, Richard B.
1980 People of the Dawn. Antheneum, New York.

Traces the history of people in the New World through descriptions of important archaeological discoveries.

McGuire, Randall H., and Michael B. Schiffer
1982 Hohokam and Patayan: Prehistory of Southwestern Arizona. Academic Press, New York.

Technical but thorough overview of archaeology in southern and southwestern Arizona. Good for higher-level research.

McNutt, Nan
1988 P.A.S.T.: Project Archaeology: Saving Traditions. Sopris West, Longmont, Colorado.

A good teacher's guide, designed for middle school curriculum, but can be adapted for other grades. Interdisciplinary and flexible, entire curriculum is approximately 70 hours.

Meyer, Larry L.
1975 Shadow of a Continent: The Prize that Lay to the West — 1776. American West, Palo Alto.

Good historical overview of the history we usually don't get in textbooks — the French, Spanish, Russian, and British exploration, occupation, and use of the trans-Appalachian west in the 1700s. Best for higher-level research.

Miller, Jeanne
The Hohokam. An Independent Study. Thinking Caps, Inc. P.O. Box 26239, Phoenix 85068 (602-870-1527).

A module designed for honing critical and higher-level thinking skills.

Nabhan, Gary Paul
1985 Gathering the Desert. University of Arizona Press, Tucson.
1987 The Desert Smells Like Rain: A Naturalist in Papago Indian Country. North Point Press.

Lively, personal descriptions of Papago country and how Papagos use the desert. Nabhan's style is enjoyable, would work well in "read-aloud" situations.

National Geographic Society
1976 Clues to America's Past. National Geographic Society, Washingtion, D.C.

Tells about American archaeology through stories about excavations at various sites. Chapter 3, "From the Words of the Living: The Indian Speaks," describes Indians at the time Europeans arrived, based on eyewitness accounts. Much of this chapter is about the lower Mississippi Valley.

Niethammer, Carolyn
1974 American Indian Food and Lore. Macmillan, New York.

A good summary source of information on how American Indians, especially those in the Southwest, use various wild and domestic plants. Recipes included are easy to follow. (The challenge is in finding the food!)

Noble, David Grant, editor
1991 The Hohokam: Ancient People of the Desert.

Contains seven scholarly but nontechnical articles on various aspects of Hohokam archaeology, including use of plants, craft arts, religion, and rock art. Good for upper levels. Articles (especially Wilcox's "Hohokam Religion: An Archaeologist's Perspective") are good for provoking discussion.

Patterson, Alex
1992 A Field Guide to Rock Art Symbols of the Greater Southwest. Johnson Books, Boulder.

A practical guide that presents rock art from a descriptive point of view. It helps readers understand the many nuances of studying rock art without being overly dramatic or scientifically obtuse. Reference book for elementary readers and above--younger children may need help with the text but will enjoy the drawings.

Pfefferkorn, Ignaz
1989 Sonora, A Description of the Provenience. Translated and annotated by Theodore E. Treutlein. University of Arizona Press, Tucson.

A remarkable book first published in 1794 and 1795 by a Jesuit missionary who wrote about his travels and experiences while stationed at the missions of Ati in northern Mexico and Guevavi in southern Arizona during 1756-1761. Valuable for Pfefferkorn's detailed descriptions of the land, animals, plants, and people of Sonora during the Spanish colonial period. Awkward in its antiquated writing style and derogatory comments, but good reference and for high level H.S.

Pike, Donald G.
1974 Anasazi: Ancient People of the Rock. American West Publishing Company, Palo Alto, California.

Good coffee-table style book on the Anasazi with a brief look at "related" cultures including the Sinagua, Salado, and by association, the Hohokam. Excellent photos by David Muench.

Pinney, Roy
1970 Underwater Archaeology: Treasures Beneath the Sea. Hawthorn Books, New York.

Tells about interesting underwater sites, the history of diving, the technology of underwater archaeology, and the training of underwater archaeologists. Of local interest is the chapter on American history underwater.

Poole, Lynn, and Gray Poole
1961 Carbon 14 and Other Science Methods that Date the Past. McGraw-Hill, New York.

Discusses radiocarbon dating, thermoluminescence, and other techniques for telling the age of archaeological sites. Techniques have been modified since the book was written.

Russell, Frank
1975 The Pima Indians. University of Arizona Press, Tucson. Originally published in 1908 by the Bureau of American Ethnology.

Detailed description of the way of life, including the material culture, of the Pima Indians around the turn of the century. Especially good for pictures of Indians and their tools. Reference.

Sale, Kirkpatrick
1990 The Conquest of Paradise: Christopher Columbus and the Columbian Legacy. Alfred A. Knopf, New York.

Good, readable account of the impact of Columbus's voyages. Discusses the ecological as well as historical impacts.

Salts, Bobbi
1991 Southwestern American Indian Discovery. American Educational Press, in association with the Heard Museum, Phoenix.

Coloring-book style guide, contains activities and one-page descriptions of past and present Arizona Indian groups.

Sherratt, Andrew
1980 The Cambridge Encyclopedia of Archaeology. Crown Publishers, New York.

Comprehensive volume. Good for general perusal and short research papers. Scholarly, but accessible, written in British style.

Snow, Dean
1976 The Archaeology of North America. Viking Press, New York.

Scholarly, but presents archaeology in a more romantic light than most scholarly books. Interesting illustrations.

Southwest Mission Research Center
1986 Tucson: A Short History. Southwest Mission Research Center, Tucson.

Well-written overviews of the various phases of Tucson's history. Easy to read. Strong upper-level elementary and above.

Spicer, Edward
1962. Cycles of Conquest. University of Arizona Press, Tucson.

Good discussion of how the Pima, Papago (Tohono O'odham), Yaqui, and Western Apache were changed by contact with Spaniards, Mexicans, and Americans. Fairly technical. For upper-level research.

Stark, Rebecca
1986 Archaeology.
Archaeology Kits.
Mythology. Archaeology. Architecture
Egyptians. Maya. Minoans.
The Learning Works, Inc. Santa Barbara, California.

Stokes, William Michael, and William Lee Stokes
1980 Messages on Stone: Selections of Native Western Rock Art. Starstone Publishing, Salt Lake City, Utah.

Includes primarily rock art from eastern Utah and western Colorado, the art is grouped into categories such as plants, hunting, elementary mathematics, and fun and games. The authors (who are archaeologists) had fun with their discussions and interpretations of the rock art, and provide thought provoking but not silly interpretations. Third grade and above; good read-aloud material for younger children.

Tanner, Clara Lee
1976 Prehistoric Southwestern Craft Arts. University of Arizona Press, Tucson.

Comprehensive, nontechnical overview of arts and crafts of prehistoric southwesterners. Well illustrated, good reference source.

Time-Life Books
1987 TimeFrame Series. Time-Life Books, Alexandria, Virginia.

These books present histories of events throughout the world for various time periods. For example, Empires Ascendant: TimeFrame 400 B.C.-A.D. 200, contains chapters on Alexander the Great, Imperial Rome, the opulence of East Indian cultures, the Silk Road, and the rise of cultures in China. Barbarian Tides: TimeFrame 1500-600 B.C. discusses the Hittites, Egypt's

golden age, the rise of Greece as a power, trade in the Mediterranean, the Aryan civilization in India, and the Olmec culture in Mexico. The chapters are well-written, thought provoking, and well-illustrated. Few of the books contain information on the Americas, however. For strong upper-level elementary readers through high school.

1993-on The American Indians Series. Time-Life Books, Alexandria, Virginia.

The books in this series (which is still being published) cover archaeology (in The First Americans), Native Americans by region (in books such as Tribes of the Southern Woodlands, and People of the Desert), and topics of interest to those studying Native Americans (for example, The Spirit World and The European Challenge). Discussions of modern Indian concerns and attitudes are included in each book. Illustration labels do not seem to have been prepared with the usual care that TimeLife puts into their work, so some figures are mislabeled. Strong upper-level elementary readers on up, although the illustrations will appeal to most groups.

Todorov, Tzvetan

1984 The Conquest of America. Translated by Richard Howard. Harper and Row, New York.

An extremely interesting book about the Spanish conquest of the Americas because it presents an interpretation of the Indian view and reaction as based on Spanish and Indian texts recorded during the conquest period. A scholarly work, at times difficult to read, but nevertheless, fascinating. Reference or high level high school.

Turner, Teresa

1982 The People of Fort Lowell. Fort Lowell Historic District Board, 5344 E. Fort Lowell Road, Tucson 85712.

Meant to be used as part of the La Reunion del Fuerte walking tour, it contains well-written tidbits about the history and prehistory of the northeastern part of the Tucson Basin. Well illustrated.

Udall, Stuart

1987 To the Inland Empire. Doubleday, New York.

Coffee-table style book tracing probable route of Coronado's journey through Arizona and New Mexico.

Warren, Scott

1992 Cities in the Sand: The Ancient Civilizations of the Southwest. Chronicle Books, San Francisco.

Well-written and well-illustrated book for third grade and above. Includes thought-provoking questions.

Wesche, Alice
1977 Wild Brothers of the Indians. Treasure Chest Publications, Tucson.

Coloring-book style. Theme is Indians' concept of animals. Illustrations from North and South America, but emphasis is on Mimbres culture depictions of animals and people. Shows how to draw various figures. Upper-level elementary.

MAGAZINES AND JOURNALS

Archaeology. Written for the layperson, includes articles about recent research around the world. It also lists current archaeological exhibits, books, and films, and twice-yearly guides to visiting ongoing excavations at sites in New and Old Worlds. Published bi-monthly. Subscription costs available from Archaeology, Subscription Service, P.O. Box 50260, Boulder, Colorado 80321.

Arizona Highways. Easy to read, well-illustrated. This magazine periodically contains good, summary articles on Arizona's archaeology.

Expedition: The Magazine of Archaeology-Anthropology. Beautifully illustrated magazine has articles on archaeological and anthropological research. Published quarterly. Subscription cost available from the University Museum, University of Pennsylvania, 33d and Spruce, Philadelphia, Pennsylvania, 19104.

Kiva. Published quarterly by the Arizona Archaeological and Historical Society. Scholarly articles on archaeology and ethnology of the Greater Southwest (which includes northern Mexico). Subscription information available from Arizona Archaeological and Historical Society, Arizona State Museum, University of Arizona, Tucson, Arizona, 85721.

National Geographic. Perennial favorite that frequently includes articles on current archaeological research. Published monthly. Subscription information available from National Geographic Society, P.O. Box 2895, Washington, D.C., 20013.

National Geographic World. For children, especially upper elementary. Published monthly. Subscription information available from National Geographic Society, P.O. Box 2895, Washington, D.C., 20013.

Natural History. Publication of the American Museum of Natural History. Anthropological articles focus primarily on living cultures, but there are occasional archaeological pieces. Subscription information available from Natural History Membership Services, P.O. Box 303, Harlan, Iowa. 51593-2091.

Smithsonian. Publication of the Smithsonian Institution, includes articles on natural sciences, history, art, and technology. Articles on archaeology are infrequent, but well done. Published monthly. Subscription information available from Smithsonian Subscription Service, P.O. Box 2955, Boulder, Colorado 80321.

VIDEOS, FILMSTRIPS

Available from Sunburst Communications, 1600 Green Hills Road, Scotts Valley, California 95066:

2nd Voyage of the Mimi. A computer-based interactive unit. Incorporates archaeology, ecology, geography, and other sciences. From time to time, video portion of series is shown on PBS.

Available from the Arizona Historical Society, 949 E. Second Street, Tucson, AZ 85719 (628-5774):

The Ancient Ones. Traces Southwest prehistoric Indians including Hohokam, Anasazi, and Mogollon. Elementary and secondary. 15 minutes.

The Archaeology of Arizona. Videotape traces the prehistory of Arizona. Briefly describes the Hohokam, Anasazi, and Mogollon Indians and discusses life ways and what happened to each culture. Also available as slide show. Developed by the Archaeology for the Schools Committee of the Arizona Archaeological Council. Advanced 4-6 and above. 25 min.

Spanish Settlement of Arizona. History of the daily life of Spanish settlers is presented, using museum dioramas, artifacts, and drawings. Includes Father Kino, missions, presidios, miners, and ranchers. Elementary and secondary. 15 minutes.

What Is Archaeology. Videotape describes the four fields of anthropology and discusses the discipline of archaeology within the anthropological perspective. Slide show also available. Developed by the Archaeology for the Schools Committee of the Arizona Archaeological Council. Advanced 4-6 and above. 20 minutes.

Archaeology and Ancient Journeys, on The Learning Channel. These programs offer a wide variety of archaeological topics, from underwater archaeology at Port Royal, to an exploration of the issue of cannibalism in Anasazi sites, to discussions of Egyptian mummy preservation. The programs are often presented as a mystery but use modern archaeological ideas and techniques to support or refute the evidence. Can easily be adapted for critical and higher-level thinking exercises. Various Nova programs on PBS offer similar topics and ideas, although they sometimes use more sensational verbage than the other videos. One recent example is the video on the ancient "Ice Man" found on the border between Italy and Austria.

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Arizona Archaeological and Historical Society
1979 The Tumamoc Hill Survey: An Intensive Study of a Cerro de Trincheras in Tucson Arizona. The Kiva vol. 45(1 and 2).

Bartlett, Michael H., Thomas M. Kolaz, and David A. Gregory
1986 Archaeology in the City. University of Arizona Press, Tucson.

Bolton, Herbert
1919 Kino's Historical Memoir of Pimeria Alta. vol. 1. Arthur H. Clark, Cleveland.

Budge, E. A. Wallis
1960 The Book of the Dead. Bell Publishing, New York.

Cassells, E. Steve
1983 The Archaeology of Colorado. Johnson Brothers, Boulder, Colorado.

Cordell, Linda S.
1984 Prehistory of the Southwest. Academic Press, Orlando.

DiPeso, Charles C.
1951 The Babocomari Village Site on the Babocomari River, Southeastern Arizona. Amerind Foundation Papers No. 5. Amerind Foundation, Dragoon, Arizona.

1956 The Upper Pima of San Cayetano del Tumacacori: An Archaeological Reconstruction of the Ootam of Pimeria Alta. Amerind Foundation Papers No. 7. Amerind Foundation, Dragoon, Arizona.

Doelle, William H.
1981 The Gila Pima in the Late Seventeenth Century. In The Protohistoric Period in the North American Southwest, A.D. 1450-1700, edited by David R. Wilcox and W. Bruce Masse, pp. 57-70. Anthropological Research Papers No. 24. Arizona State University, Tempe.

Doelle, William H., and Henry D. Wallace
1990 The Transition to History in Pimeria Alta. In Perspectives on Southwestern Prehistory, edited by Paul E. Minnis and Charles L. Redman, pp. 239-257. Westview Press, Boulder, Colorado.

English, Sandal
1981 Fruits of the Desert. Arizona Daily Star, Tucson.

Fagan, Brian M.
1978 In the Beginning: An Introduction to Archaeology. Little, Brown and Company, Boston.

1985 The Adventure of Archaeology. National Geographic Society, Washington, D.C.

Ferguson, William M., and John Q. Royce
1977 Maya Ruins of Mexico in Color. University of Oklahoma Press, Tulsa.

Forbes, Jack
1965 Warriors of the Colorado. University of Oklahoma Press, Norman.

Haury, Emil W.
1976 The Hohokam, Desert Farmers & Craftsmen: Excavations at Snaketown 1964-1965. University of Arizona Press, Tucson.

Houghton Mifflin
1987 Information Please Almanac, Atlas & Yearbook, 1987. Houghton Mifflin, Boston.

Jennings, Jesse D.
1983 "Origins." In Ancient North Americans, edited by Jesse D. Jennings, pp. 25-67 W. H. Freeman and Companty, San Francisco.

Kapp, Ronald O.
1969 How to Know Pollen and Spores. Wm. C. Brown Company Publishers, Dubuque, Iowa.

Kidder, Alfred Vincent
1962 An Introduction to the Study of Southwestern Archaeology. Revised edition. New Haven, Yale University Press.

Klie, Barbara J., Alan H. Simmons, and Susan Jackson
1982 AZ P:6:26. In The Chevelon Region pp. 54-71. Cholla Project Archaeology, Vol. 2, J. Jefferson Reid, editor. Archaeological Series No. 161. Arizona State Museum, University of Arizona, Tucson.

McGuire, Randall H., and Michael B. Schiffer
1982 Hohokam and Patayan: Prehistory of Southwestern Arizona. Academic Press, New York.

McNeish, Richard S.
1974 "The Origins of New World Civilization." In New World Archaeology. Readings from Scientific American. pp. 155-163.

Martin, Paul S., and Fred Plog
1973 The Archaeology of Arizona: A Study of the Southwest Region. Doubleday/Natural History Press, Garden City, N.Y.

Masse, W. Bruce
1981 A Reappraisal of the Protohistoric Sobaipuri Indians of Southeastern Arizona. In The Protohistoric Period in the North American Southwest, A.D. 1450-1700, edited by David R. Wilcox and W. Bruce Masse, pp. 28-56. Anthropological Research Papers No. 24. Arizona State University, Tempe.

1987 Archaeological Investigations of Portions of the Las Acequias-Los Muertos Irrigation System: Testing and Partial Data Recovery within the Tempe Section of the Outer Loop Freeway System, Maricopa County, Arizona. Arizona State Museum Archaeological Series No. 176. University of Arizona, Tucson.

Nentvig, Juan, S.J.
1980 Rudo Ensayo: A Description of Arizona and Sonora in 1764, translated and annotated by Alberto Francisco Pradeau and Robert R. Rasmussen. University of Arizona Press, Tucson.

Niethammer, Carolyn
1974 American Indian Food and Lore. Macmillan, New York.

Noble, David G., editor
1991 The Hohokam: Ancient People of the Desert. School of American Research Press, Santa Fe.

Ortiz, Alfonso, editor
1983 Southwest. Handbook of North American Indians, vol. 10, William G. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Otto, John Soloman
1980 Race and Class on Antebellum Plantations. In Archaeological Perspectives on Ethnicity in America, edited by Robert L. Schuyler, pp. 3-13. Baywood, Farmingdale, N.Y..

Rathje, William L., and Michael B. Schiffer
1980 Archaeology. Harcourt Brace Jovanovich, New York.

Riley, Carroll L.
1982 The Frontier People: The Greater Southwest in the Protohistoric Period. Occasional Papers No. 1. Southern Illinois University Center for Archaeological Investigations, Carbondale.

Russell, Frank
1908 The Pima Indians. Annual Report of the Bureau of American Ethnology 26:3-389. Reprinted by University of Arizona Press, Tucson, 1975.

Salt River Project
1986 Gift from the Hohokam. Published in February 1986 by the Communications and Public Affairs Department of the Salt River Project, Phoenix.

Schiffer, Michael B.
1987 Formation Processes of the Archaeological Record. University of New Mexico Press, Albuquerque.

Slaughter, Mark C., Lee Fratt, and Kirk Anderson
1991 Making and Using Stone Artifacts: A Context for Evaluating Lithic Sites in Arizona. Submitted to Arizona State Parks by SWCA, Inc., Environmental Consultants, Tucson.

Smith, Shelley, J., Danielle M. Paterson, and Jeanne M. Moe
1990 Intrigue of the Past: Investigating Archaeology. A curriculum sponsored by the Utah Interagency Task Force on Cultural Resources, Bureau of Land Management, U.S. Forest Service, and National Park Service, Utah.

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1986 Tucson: A Short History. Southwest Mission Research Center, Tucson.

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1979 Archaeology. Holt, Rinehart and Winston, New York.

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U.S. Department of the Interior Geological Survey
1958 Cochise Quadrangle Arizona-Cochise Co. 15 Minute Series (Topographic). U.S. Geological Survey, Washington, D.C.

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1988 Archeological Survey and Testing at Petrified Forest National Park 1987. Publications in Anthropology No. 48. USDI, National Park Service, Western Archeological and Conservation Center, Tucson.

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1990 Transition or Period: Systematic Change in the Southwest, A.D. 1250-1700. In Perspectives on Southwestern Prehistory, edited by Paul E. Minnis and Charles L. Redman, pp. 308-313. Westview Press, Boulder, Colo.

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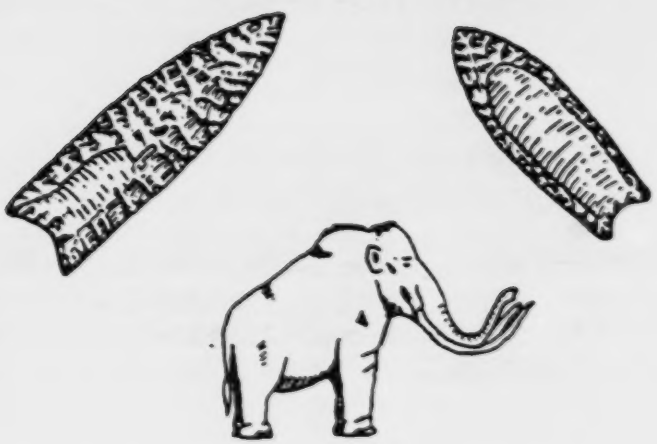
SECTION G

GLOSSARY



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— A —

Adobe. When used by archaeologists who study the Hohokam, this term means the thick layers of mud used for walls. Unlike Spanish or Mexican adobe, which has straw and is formed into bricks, Hohokam adobe is built up in long layers and has no added straw or grass. After A.D. 1200, the Anasazi made adobe bricks that did not contain straw or grass. See Rammed earth.

Anasazi. (pronounced An-ah-sáh-zee). A Navajo word meaning "Enemy Ancestors." Archaeologists use the term Anasazi to describe the prehistoric people of northern Arizona, northern New Mexico, southwestern Colorado, and southern Utah.

Apache. The word probably comes from a Zuni word meaning "Enemy." The Apache include several different tribes — Chiricahua, Jicarilla, Mescalero, and so on. These groups may have entered southern Arizona in the late 1500s or early 1600s. Apaches lived in wickiups, and farmed, hunted, and raided other groups of people.

Archaic culture. Archaeological name for the people who came before the Hohokam, Anasazi, and Mogollon. The culture dates from about 10,000 to 1,600 years ago (8,000 B.C. to A.D. 300).

Archaeomagnetic dating. By studying the alignment of magnetic particles found in burned soil (often clays) of a feature such as a hearth, can determine when a feature was used. This works because the earth's magnetic poles change position over time, and if heated, the magnetic particles align with the pole's position at a particular time.

Argillite. A dense, red, easily carved stone used for jewelry and carvings.

Artifacts. Anything made or used by people.

Assemblage. A group of artifacts or features. Assemblages are used to interpret activities and time periods at sites.

Athapaskans. People who speak an Athapaskan language. Most Athapaskans today live in Canada and Alaska. The Navajo and Apache are Athapaskans who migrated south. Athapaskans may have been the last group of people (except for the Eskimos) to cross over the Bering Strait.

Atl-atl. A spear throwing device, often made of wood or bone.

Awls. Sharp, pointed tools, often made of bone, that were used to punch holes in leather and other objects.

Ax. Tool used for choping wood. Stone axes were made from very dense, heavy rock and were made by pecking, grinding, and polishing the stone into shape.

— B —

Biface. A stone tool that has had flakes removed from two sides. Stone knives are often bifaces. Projectile points are also bifaces. (See the definition for uniface for contrast.)

Black-on-white pottery. Pottery, from northern Arizona or New Mexico, or from southwestern New Mexico. It has a white slip or clay with black paint.

— C —

Caliche. A hard, chalky substance made of calcium carbonate. It occurs naturally in many places in southern Arizona.

Charcoal. Burned, woody plant material.

Ceramic. Another word for pottery.

C-14. See Radiocarbon dating.

Chipped stone. Stone artifacts and waste material that are made by hitting a rock in a certain way to make chips, or flakes come off. Projectile points, knives, and scrapers are chipped stone artifacts.

Chopper. A simple tool, made from a cobble with a few flakes removed. It was used for chopping or hacking at things.

Conifers. Cone-bearing trees such as pine, Douglas fir, and juniper. Usually evergreen and often good for dendrochronology.

Context. The association of artifacts with features.

Copper bells. These bells look like small sleigh bells and were made in Mexico and traded to the Hohokam.

Cordage. A term used to describe plant fiber twisted into cord, rope, or yarn.

Core. A lump of stone from which flakes have been removed.

Corrugated pottery. Corrugated pottery is made by layering coils of clay on top of one another and only smoothing the inside of the coils together. The outside is left in flattened ridges or layers. These ridges can be patterned in many different ways. Corrugated pottery was made predominately by the Anasazi and the Mogollon.

Cremation. The burning of a human or animal body.

Culture. The material, social organization, and customs of a particular group of people. Archaeologists define cultures on the basis of material remains--artifacts and features--that are distinct from other groups.

— D —

Datum. Archaeologically, the point of reference for measurements on a site.

Daub. Pieces of clay or mud that contain fragments of grass or sticks. Pieces of daub are from eroded house walls and roofs.

Dendrochronology. Also known as tree-ring dating. By matching growth ring patterns of certain types of trees (usually conifers), researchers can determine the age at which the tree died.

Drill. A wooden shaft with a sharp stone tip used to drill holes in objects. Drill tips could also have been made of bone, shell, or, for very delicate work, cactus needles.

— E —

Ethnic. Relating to people who are grouped according to common racial, tribal, religious, or other backgrounds.

Ethnobiology. The study of plants and animals used by particular ethnic groups.

Ethnographic analogy. The comparison of the artifacts, features, and activities of modern or historic peoples with prehistoric cultures. Often used by archaeologists to interpret sites.

Ethnohistory. The written study of people do not have their own written language.

— F —

Fire-cracked rock. A natural (not shaped by humans) stone that has cracked because it was exposed to heat. Often these are found in hearths or roasting pits.

Flake. A piece of stone, with one or more sharp edges, that is struck from a core by a blow with a hammerstone or by applying pressure from an antler tine or similar tool. Most flakes are thrown away as the waste product of making a stone tool. Some flakes, however, are used as knives or scrapers. "Flaked stone" is another, commonly used term for "chipped stone."

Formation processes. The natural and cultural events that occur after a site (or part of a site) is abandoned that affect the remains that archaeologists study.

— G —

Ground stone. Stone tools that are used primarily for grinding different materials. A mano is an example of a tool used for grinding material. Ground stone tools also include artifacts that are formed by grinding the sharp surfaces off of a rock. A stone ax is an example of a tool made by grinding.

Guayule. (Why-oo-leh). A plant native to northern Mexico that has latex, the material from which rubber is made. Used prehistorically by Indians in Mexico for rubber, companies in the United States also have experimented with the plant to see if it can be grown commercially.

— H —

Hakatayan. (Hah-kah-tie-on). Archaeological term for peoples who lived in the western deserts of Arizona and along the Colorado River during prehistoric times.

Hammerstone. A rock used to remove flakes from cores to make stone tools. Hammerstones could also have been used for other jobs, including pounding stakes into the ground or roughening the surface of metates.

Hand stone. A hand-held stone used for grinding. Hand stones, which have a variety of shapes, were used for many tasks from grinding nuts and paints to smoothing walls and floors.

History. The record of human events after writing was developed.

Hohokam. (pronounced Ho-ho-káhm) A Piman word meaning "those who have gone" or "all used up" that is used by archaeologists to describe the Indians that lived in the Sonoran Desert of central southern Arizona.

Human osteology. The study of the human skeleton.

— I —

Inhumation. Burial of a human or animal body. Inhumations are often buried with "grave goods" — pottery, jewelry, and stone tools.

Isolated find. A single artifact or small number of artifacts not associated with any other artifact or feature. A feature such as a single hearth may also be considered an isolated find.

— K —

Knife. A tool used for cutting.

— L —

Lithic. From the Greek word for rock. Archaeologists use the term "lithic" to refer to any type of stone tool or waste material found on a site, such as "ground stone lithics," chipped stone lithics." A lithic scatter is a site where chipped and/or ground stone artifacts are found.

— M —

Macaw. A large, parrot-like bird with colorful feathers. Macaws are found in Mexico and Central and South America, and were traded to the Hohokam, Mogollon, and Anasazi during prehistoric times. One small macaw, the thick-billed parrot, lived in the mountains of southern Arizona. The birds are being reintroduced into the Chiricahua Mountains.

Majolica. (My-yo-li-cah). A richly decorated, painted pottery made in Mexico and traded into the Southwest during the Spanish colonial and Mexican periods. Majolica is often used to date sites to the Spanish colonial and Mexican periods. The style of pottery originated in Majorca, then spread to Italy and Spain. It was one of the earliest crafts brought by the Spanish into the New World.

Mammoth. An elephant-like animal that lived during the Ice Age (or Pleistocene period). Several species of mammoths existed all over the northern hemisphere. Wooly mammoths are most often found in colder regions like the Arctic. The mammoths hunted in Arizona were Columbian mammoths.

Mano. A hand-held stone used with a metate. Manos are often rectangular in shape.

Mesoamerica. Defined by archaeologists, it extends south of the states of Jalisco and Tamaulipas in Mexico to Costa Rica. It includes cultures such as the Mayans, Toltecs, Olmecs, Mixtecs, and Aztecs, who developed city-states and had highly organized religious and social systems. Archaeologists constantly argue about the boundaries of Mesoamerica, and there are some who include the prehistoric cultures of Colima, Jalisco, and Nayarit in the definition. North of Mesoamerica was the "Gran Chichimeca," the frontier where "savages" (as defined by the Aztecs) lived. There is no doubt that Mesoamerican cultures influenced the cultures of the American Southwest, whether through trade or actual contact.

Mesquite beans. Fruit from a mesquite tree, including the pods and beans inside them. Used for food by Indians in Arizona, New Mexico, Texas, and Mexico.

Metate. (Meh-tah-teh) A large rock, sometimes shaped before use, that was used as a bottom stone on which material was ground. Material was placed on top of metates and then a mano or hand stone was used to grind the material. Metate is derived from the Aztec (Nahuatl) word "metatl."

Mica. A shiny mineral that flakes into thin sheets. Often the metallic-looking material found in Hohokam pottery is mica.

Midden. A pile of garbage.

Mogollon. (pronounced Moh-go-yóhn) An archaeological term for the people who lived to the northeast and east of the Hohokam region, in the Mogollon Rim region of Arizona, and in southwestern New Mexico.

Mortar. Any stone with a cup-shaped depression used as a platform to hold seeds or other materials for pounding and grinding. Mortars found on huge rocks that are too large to be moved are called bedrock mortars.

— N —

Navajo. A people who today live in northeastern Arizona, northern New Mexico, and southwestern Colorado. They are related to the Apache, and until the 1700s were considered part of the same culture. The name is from "Apaches de Navahu." Navajo is a Tewa (Puebloan) word meaning "big fields," which refers to the fact that the Navajo lived near the Puebloan fields, while the Apache moved around and raided the Puebloan groups. The Navajo entered the Southwest sometime after A.D. 1400. Their traditional house is the hogan.

Needles. Tools used for sewing, like awls, but with a hole for thread at one end. Prehistorically, they were made of bone, shell, cactus needles, or the tips of agave and yucca leaves.

New World. Term for North and South America. After Columbus's discovery, Europeans referred to the western hemisphere as the "New World."

— O —

O'odham. (Ah-áh-dahm). Means "people" in the Piman language. Refers to any Piman speaking people. Akimel O'odham are the "River People" (the Pima), and Tohono O'odham are the "Desert People" (the Papago). The Hi'ached O'odham, or "Sand Papago" live in Mexico.

Old World. The continents of Europe, Asia, and Africa. Europeans contrasted the Old World with the Americas, the "New World."

Osteology. The study of bone. Human osteology is the study of human bone.

— P —

Paleo-Indians. The first discoverers of North and South America, they lived on the continents from about 15,000 to 9,000 years ago. Also known as big game hunters because they hunted mammoth and large bison.

Paleontology. The study of past life forms (animals and plants). The field overlaps with archaeology when extinct life forms (like mammoths) and people are found together in a site.

Palette. Usually a rectangular flat stone, usually made of slate, schist, or other rocks that split easily into slabs. Palettes often have designs carved on them. Palettes may have been used to hold and mix mineral paints or other substances. .

Palynology. The study of pollen.

Papago. Refers to the Tohono O'odham who live in the desert areas west of the Santa Cruz River, south of the Gila River (into northern Mexico). Means "bean eater" in Piman, referring to their reliance on tepary beans, a desert-adapted bean plant.

Paste. The material that pottery is made from, the mixture of clay and temper.

Patayan. (Pah-tie-on). Archaeological term for people who lived in western Arizona and along the Colorado River during prehistoric times.

Pestle. A rod-shaped stone tool used with a mortar to pound and grind materials.

Petroglyph. A symbol or figure pecked or carved into rock.

Pictograph. A symbol or figure painted on a rock.

Pima. The common term for the Akimel O'odham (River People), who live along the Gila and Salt Rivers. The term Pima also includes speakers of the Piman language, including many Indians in northwestern Mexico. Arizona is considered the home of the "upper Pima", and Mexico the home of the "Lower Pima."

Pimeria Alta. "Land of the upper Pima" in Spanish, this is a Spanish colonial term for southern Arizona and parts of northern Sonora.

Plain Ware. Pottery that does not have any kind of decoration.

Plaza. An open area on a site where people gather to work, talk, or otherwise pass the time. It usually lies between groups of houses or other features.

Polychrome. Any piece of pottery with more than two colors used for decoration.

Potsherds. (Sherd rhymes with Bird.) Broken pieces of pottery.

Prehistory. The period of time before written history.

Presidio. A Spanish colonial or Mexican period fort.

Projectile points. A biface of special shape used for the tip of an arrow or spear.

Pronghorn. Often called "antelope," or "pronghorn antelope," these animals are small ungulates that are native to North America. Their populations were once fairly extensive in grassland areas of Arizona. One subgroup of pronghorn, the Sonoran pronghorn, lives in the Sonoran Desert.

Provenience. Specific location of something.

— R —

Radiocarbon dating. Measures the ratios of radioactive carbon (C14) to nitrogen in organic (plant or animal) materials.

Ramada. A human-built shaded area, often rectangular.

Rammed earth. A type of construction used extensively by the Hohokam after about A.D. 1200. Adobe-like layers are produced by putting mud into forms, allowing the mud to dry, then building another layer on top of it. Casa Grande National Monument is an example of rammed earth construction.

Rancherias. A settlement of scattered houses, characteristic of Tohono O'odham and Hohokam villages.

Red-on-brown pottery. The type of pottery made by the Hohokam in the Tucson area. This pottery has designs in red mineral paint applied to a pot, the clay color of which is tan, brown, or black.

Red-on-buff pottery. The type of pottery made by the Hohokam in the Phoenix area and along the Gila River. This pottery is similar to Red-on-brown pottery, but is often lighter in color, and is more porous (has tiny holes in the paste).

Red Ware. Pottery with a red or reddish-brown slip.

Replicas. Modern copies of artifacts.

Roasting pit. A hole in the ground that is filled with rock, ash, and charcoal. Such pits were used to cook agave hearts, meat, or other foods.

Rock art. Figures and symbols pecked into or painted onto rock outcrops.

— S —

Salado. (Sah-lah-doh). Archaeological term (taken from the Spanish name for the Salt River) for the people who lived in central eastern Arizona from about A.D. 1200-1450. The Salado built platform mounds and pueblos and produced distinctive polychrome pottery that was widely manufactured and traded. They had a strong influence on the Hohokam. Archaeologists are not sure if the Salado were migrants to the area or if they developed out of the local Mogollon and/or Hohokam populations.

Scraper. A wedge-shaped tool used like a wood plane. The thick, blunt end is the end used to scrape against other objects.

Serpentine. A green, translucent stone that is easy to carve. It was used primarily for jewelry.

Sherd. (Rhymes with bird) A broken piece of pottery.

Sherd disk. A potsherd that has been made into a circular shape by chipping or grinding.

Sinagua. (Si-nah-wah). Means "without water" in Spanish. Archaeological term for peoples who lived in central-northern part of Arizona during prehistoric times. Montezuma's Castle, Tuzigoot, and Wupatki were all built by the Sinagua.

Site. A place where people have done something and left evidence of their activities behind.

Slip. A soupy, thin mixture of clay and water applied to the surface of a clay pot. Slip creates a smooth, even finish on the pot's surface and often is a different color than the clay used in making the pot.

Sobaipuri. (Soh-bay-poo-ree). Name of the Piman (O'odham) people who lived along the San Pedro and Santa Cruz rivers in the late 1600s, when Father Kino came into southern Arizona. The Sobaipuri were run out of the San Pedro by the Apache. They moved to San Xavier. The Sobaipuri were absorbed into the Tohono O'odham population and there are now no O'odham who identify themselves as Sobaipuri.

Spindle whorl. A circular artifact with a hole in the center made of clay or stone. It was used to aid the spinning of cotton or other plant fibers (such as agave) into thread.

Stratigraphy. The layers of cultural and natural material found at a site.

Stratum. Archaeologically, a distinctive layer of dirt or cultural material in a site. Plural is strata.

— T —

Tabular knife. A thin, tablet-shaped tool of stone that was probably used to cut agave and other plants. One edge has been chipped to make it sharp for cutting or sawing.

Temper. The rock, mineral, or organic material that is put into clay to make the clay easier to work and allow it to resist shrinkage and avoid cracking.

Teosinte (tay-o-sin-tay). A wild grass that some botanists and archaeologists think is the ancestor of corn. Today, Tarahumara Indians and other groups in northern Mexico allow teosinte to cross-pollinate their corn, because they think it strengthens the plants.

Tohono O'odham. Means "Desert People" in Piman. Refers to the Indian people who live west of the Santa Cruz River Valley and south of the Gila River (into northern Mexico). Known also as the Papago, the people have officially changed their name to Tohono O'odham.

Tree-ring dating. See Dendrochronology.

Turquoise. A blue to green stone used extensively by Indians in the Southwest for jewelry.

— U —

Uniface. A stone tool flaked on one side. (See the definition for biface for contrast.) Scrapers are often unifacially worked.

— W —

Ware. This term is used to describe pottery with common characteristics, for example, red ware or plain ware.

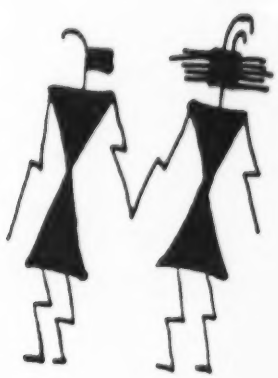
Wickiup. Usually dome-shaped, a circular structure built of grass and brush covering bent branches. Used by the Apaches and Utes. Some wickiups, built of straight branches, were cone-shaped.

— Z -

Zooarchaeology. The study of animal remains found in archaeological sites.

SECTION H

ACTIVITIES



The activities described in this section are adapted from a number of sources including the Green Box (1975, Humboldt County Environmental Education Program, Eureka, California), the Archaeology Is More Than a Dig manual (1985, Educational Enrichment Fund, Tucson), the Arizona Archaeological Council's Archaeology for the Schools Committee workshop sheets, and activities developed for "Discovering Arizona's Past," a summer enrichment program at Tubac Presidio State Historic Park. We would be happy to add any activities that you develop or have developed for your classes!

ANALYZING, MAPPING, AND INTERPRETING

Purpose: This activity gives students the opportunity to use artifact analysis and mapping to interpret a site. It can also be used to develop a discussion about archaeological preservation and variations in interpretation among individuals.

Students will need pencils, paper, and large sheets of graph paper. Ruled Stenocraft Easel Pads with 1 inch squares work well. They are available at most office supply stores. Students can work individually or in groups.

1. Give students a list of artifacts and features that are associated with a particular culture and/or time period. Sample lists are provided at end of the activity, but others can be gleaned from books and articles on various cultures and time periods—including our own. National Geographic and Archaeology magazines are good sources of information.

2. Students should examine the list and imagine an event that might have happened that would cause those artifacts to become part of the archaeological record. (For example, an adobe building built in 1860 burned down with all of the owners' belongings inside. Those belongings included a kerosene lantern, a book, a pair of spectacles, a frying pan, and a pair of trousers.) They may add artifacts and features to the list, as long as they are appropriate to the time period and culture. Have the students write a story about the imaginary event.

3. Students should imagine how their event would look to an archaeologist digging it up today. What artifacts and features would be left in the ground? What artifacts would be missing? Using the graph paper, have students draw a map of the event, placing the features and artifacts in situ where they would be found by archaeologists. (Sometimes it is easier for students to draw the map first, and then write the story.) They have now created a site map.

4. Students should trade their maps with each other and write a story interpreting the events as they see them. Compare the "real" event (as developed in the first story) with the "archaeological" event (as seen in the second story). Discuss the differences and the gaps in archaeological knowledge.

Optional exercise: To help students understand how to develop and read maps, have them label their map-stories as a grid, with numbers across the bottom, and along one side, starting with zero at the lower left corner. Be sure the maps have a "north" orientation on them, so that the map users can orient themselves. And add a scale, so users know how large the area to be interpreted is. Students can then play a "battleship" game with the maps, by developing an "excavation" plan that will only sample the site drawn on the map. For example, students might "dig" in grid squares 4N 6E, 8N 10E, and 2N 12E. (N = north, E = East of the corner 0/0 point). Depending on what is drawn in those grids, students may or may not be able to interpret the site and the event.

Sample Artifact and Feature Lists

Hohokam village

3 pit houses
1 ramada
4 undecorated storage jars
2 turquoise beads
1 stone projectile point
1 metate
1 broken mano
1 shell bracelet fragment

Paleo-Indian site

mammoth bones
fire-cracked rock
2 stone spear points
3 stone scrapers
2 stone knives

Archaic site

1 metate
1 mano
1 mortar
1 storage pit
3 hearths
1 pile of chipped stone
1 clay figurine

Historic Spanish site

10 pieces of majolica pottery
1 rock house foundation
1 metal lance point
1 coin
1 broken water jar
1 metal crucifix
1 gun flint

Historic Anglo Site

1 tin can
1 small pile of slag (from smelting)
1 rifle cartridge
1 porcelain doll arm
1 glass beer bottle
1 broken slate pencil
10 pieces of earthenware (from a cup or bowl)
1 wagon wheel hub

TODAY'S ARTIFACTS

Purpose: This activity gives students an opportunity to examine American culture through artifacts, list possible functions of the artifacts, and suggest what the artifacts tell about the culture.

The Setting: The year is A.D. 3000 and the students are archaeologists who have excavated a site in Arizona.

1. Select five artifacts for the students to analyze. Suggested items include coins, aluminum cans and their opening tabs, records and cassette tapes, kitchen utensils, religious jewelry or figurines, and toys. The students will be handling and examining the artifacts, so you should have several sets. One set of five artifacts per five students is an ideal number. Label each artifact with an identifying number or letter.

2. Have each student select an artifact and write a description of the appearance of the artifact.

3. After the students have described all the artifacts, they will assign a function to each. Remind them that they are in the year A.D. 3000 and that they know little about twentieth-century life. Students should be encouraged to be creative without being silly.

4. Students should draw conclusions about the culture based on the artifacts analyzed. The conclusions should be drawn from all five artifacts studied together (as an assemblage).

5. Discuss what the students learned about how archaeologists draw conclusions. How was the activity similar to the way archaeologists work? (Like archaeologists, the students described the artifacts' appearance and function.)

(Adapted from Classroom Archaeology by Nancy W. Hawkins, Division of Archaeology, Office of Cultural Resource Development, State of Louisiana, Baton Rouge.)

CAPSULE OF AMERICA

Purpose: The goal of this activity is to learn what an artifact is and to think about American culture through artifacts.

Premise: Students are to choose objects to send to a distant place where nothing is known about the United States. The class as a whole will eventually decide on 20 artifacts that portray American life today.

1. Discuss the meaning of the term "artifact" and what an artifact can show about the people who use it. Artifacts can indicate the type of technology of the maker and user and can give information about values and practices in society.

2. Divide the class into four groups. Each group should list 10 artifacts to send to the distant place. Have each group make a list of the artifacts and what each artifact reveals about American life.

3. Bring the groups together and have each group read its list. Have the class decide on a list of the 20 artifacts that tell the most about American life.

4. Lead a discussion about the list. What is the picture of American life based on the artifacts? What things are missing or misrepresented?

(Adapted from Classroom Archaeology by Nancy W. Hawkins, Division of Archaeology, Office of Cultural Resource Development, State of Louisiana, Baton Rouge.)

NEWSPAPER ARTIFACTS

Purpose: This activity gives students an opportunity to improve skills in logic and analysis and to understand the ways archaeologists draw conclusions about people based on the things they discard.

Procedure: Students will compile ads from the paper that could have been placed by one family. Each student will then describe another student's advertisement family.

1. Discuss with students the types of artifacts archaeologists study. Many of the remains at an archaeological site are those that were discarded or abandoned. This means that archaeologists do not get a complete view of all the artifacts used at a site.

2. Ask each student to select 20 for-sale ads from the newspaper, keeping in mind that the ads represent things being sold by one imaginary family. The ads will provide clues about the size of the family, the number and age of any children, whether the family lives in a rural or urban area, and whatever other clues are possible (e.g., is the family musically inclined--or thought it was?). Students should cut the ads out of the paper, eliminating names, addresses, and telephone numbers of sellers. Each student should paste or tape the ads on a piece of paper.

3. Based on the ads, each student should write on a separate piece of paper a brief description of the people who placed the ads. The description would explain why the family had each of the items that are now for sale. For example, someone selling a five-bedroom house for $400,000 is probably wealthy and may have several children.

4. Have the students share their ads and family profiles with each other. Do the students agree with each others profiles? Did the students reason thoroughly in establishing their family profiles?

5. Discuss the activity. How is analyzing for-sale items similar to analyzing remains at an archaeological site? Why do people sell things now? How did people obtain goods in the past? Why do people leave things at an archaeological site?

(Adapted from Classroom Archaeology by Nancy W. Hawkins, Division of Archaeology, Office of Cultural Resource Development, State of Louisiana, Baton Rouge.)

STORY IN A BAG

Purpose: To allow students to develop their powers of observation and reasoning by studying familiar objects.

Materials: 1 brown grocer sack per student
10-12 items from home, selected by each student
1 lab record sheet per student
1 pencil and metric ruler per pair of students

Process:

Collection: Each student collects 10 to 12 items from home that describe that student. *There should be no names or identification on any of the items, and nothing valuable should be used.* As each child turns in their bag, a code is marked on the bag corresponding with a code that is by each child's name on a student list.

Distribution: Sutdents are assigned partners and each student is given a bag (not their own or their partner's) and a lab sheet.

Activity: Each child removes the artifacts from his or her bag and records each on the record sheet. Observational skills, senses, and scientific skills are used as the objects are recorded. Deductive reasoning helps students reach conclusions: whose bag is it and how did they figure it out.

What were the students able to discover by looking at this small sample of objects? Can anything be learned about the life of the person just by looking at the articles in the bag?

(Adapted by Carol Ellick from Classroom Archaeology by Nancy W. Hawkins, Division of Archaeology, Office of Cultural Resource Development, State of Louisiana, Baton Rouge.)

FOOD

Purpose: To let the students discover what foods the prehistoric Indians in their area ate, how our modern food habits differ, and why.

1. Have students make a list of what the prehistoric Indians could have used for food in your area. Remember that not all of the plants and animals found in the area today were there prehistorically. Were the foods available at all times of the year? How did the Indians obtain those foods? Did they grow them, gather or hunt them, or barter or trade for them? What seasons of the year did the plant foods grow? Were all animals available all year round?

2. Have students make a list of the plants growing in their neighborhoods that prehistoric Indians could have used for food, and a list of introduced foods (like oranges and chickens). How many of the plants and animals are introduced (non-native, European or Asian) foods, and how many are local (naturally occurring or domesticated by the Indians)?

3. Have the students make a list of the foods they eat. How many of these are found naturally or are grown or raised in your area? From how far away do these foods come? How are they obtained? Are they available all year round or are they available only during certain seasons? How have new foods changed the environment and the economy of an area?

FOOD PRESERVATION

Purpose: This activity helps students think about preservation on an archaeological site and consider American eating and packaging practices.

Setting: If digging in a site in the year A.D. 3000, what evidence of food remains would archaeologists find?

1. Discuss the preservation of food at archaeological sites. When archaeologists excavate, they do not find remains of everything people ate because most food decays quickly. Archaeologists usually draw their conclusions about subsistence after identifying fragments of bones, shells, nutshells, and seeds found in the refuse areas.

2. Have students list food from three parts of American life that would survive under normal archaeological conditions until the year A.D. 3000. Divide the class into three groups and assign each group a menu for one of the following meals: 1. a typical dinner at home, 2. a meal at a fast-food restaurant, and 3. a lunch at a school cafeteria. Have each group list the foods (without containers) that would survive at a site.

3. After each group has completed its list, have them present their conclusions. Lead a discussion about other remains (containers, cooking utensils, etc.) that would give information about our food preferences. Remind the students that aluminum, ceramics, plastics, and glass survive a long time, but that paper and ink do not.

4. Discuss what this exercise teaches about archaeological sites. Do archaeologists get a good idea about what people ate? Can they ever be sure of all the foods people ate at any site? What about clothing and tools that might have been used a thousand years ago? When an archaeologist excavates a site that is five or ten thousand years old and finds only stone projectile points, what does this mean? Discuss how preservation limits archaeological research.

(Adapted from Classroom Archaeology by Nancy W. Hawkins, Division of Archaeology, Office of Cultural Resource Development, State of Louisiana, Baton Rouge.)

DECOMPOSITION

The purpose of this activity is to have students think about how things decay, and how the natural process of decay affects what archaeologists are able to find in sites.

For this activity you will need 1 gallon plastic bags, leaves, twigs, and other yard or desertlike debris, scraps of paper, pieces of plastic, pieces of glass or ceramics, metal—both aluminum and iron if possible, vegetable food scraps, (corn cobs, for example)* burned paper, wood, and dirt. Be sure the objects are broken into small pieces.

1. First, have the students make a list of the things that they are putting in the bags, making notes about the condition of the objects they use. Then, using two bags (one inserted into the other) for each group, have the students insert the ingredients into the bags. Now, decide on different decomposition environments. One group might moisten the contents of their bag, seal it, and place it in a dark corner. Another might leave theirs open, placing it on a sunny shelf. Another might seal theirs without adding any water, another could put theirs in a refrigerator, and so on. Leave the bags in their environments for at least two weeks.

2. Have the students make everyday observations about their bags — what seems to be happening in each environment?

3. At the end of the decomposition session, have each student or group of students dump their bags out onto newspapers and make observations about what decomposed and what didn't. Which environments were best for the preservation of paper, wood, seeds, iron, and so on? Did any of the objects stay the same? Discuss what would happen to the garbage in 50 years, 100 years, 1000 years. What kinds of things are missing from the archaeological environment?

*Keep an eye out for creepy crawlers if you add the vegetable scraps.

CERAMIC RECONSTRUCTION

Purpose: This activity gives students the opportunity to participate in a common type of archaeological artifact analysis and to understand why pottery is important to archaeologists.

You will need several ceramic vessels (cheap Mexican-style terracottas or second-hand dishes work well), masking tape or glue, pencils, and drawing paper.

1. Discuss the significance of ceramics (pottery) to archaeologists. Ceramics can reveal how old a site is (based on changes in decoration and shape); activities at a site such as food preparation, water and food storage, serving, and so on; and the cultural affiliation of the people at the site. At historic sites, ceramics also can reveal how wealthy people were (based on the types of ceramics they used), when a site was occupied, and from where people purchased household goods.

2. Break the ceramic vessels beforehand, or have the students do it. Archaeologists rarely find all of the pieces, so set a few sherds from each one aside. Then, there are two options: a. put each vessel in a separate bag, or b. place all the vessel pieces in a box. (Option b is closer to the way archaeologists find ceramics in a site).

3. If each vessel is placed in a bag, give a bag to each student. Have the student select one sherd from their bag (or the communal box) and try to determine the shape of the vessel the piece represents. Have the students draw the piece of the vessel on paper, and then sketch in the overall shape and approximate size. If a design is visible, have them try to determine the overall design on the vessel. Archaeologists seldom try to reconstruct all of the vessels from a site, so they try to determine the size, shape, and time period of vessels from fragments.

4. Have the students reassemble the vessels from the bags, or, working together, from the communal box. Have the students try to determine where the vessels came from and what they were used for.

5. Mix the set-aside sherds together and see if students can determine to which vessels the sherds belong.

6. Discuss the exercise. What skills are needed to do ceramic analysis? What other artifacts from sites can be analyzed in the same way?

(Adapted from Classroom Archaeology by Nancy W. Hawkins, Division of Archaeology, Office of Cultural Resource Development, State of Louisiana, Baton Rouge.)

SITES AND THREATS

Purpose: This activity introduces students to the importance of archaeological sites and the affect of modern activities on archaeological sites.

Procedure: Students will work together to prepare a mural of the ways that archaeological sites are destroyed.

1. Discuss with the class the importance of archaeological sites. Any place where people have left remains of their activities is a site. Sites often provide clues about everyday life that cannot be found in written records, and can only be reconstructed through archaeological research.

2. Have students research and discuss different types of archaeological sites. Suggestions include Indian campsites, shipwrecks, temple mounds, and historic forts. National Geographic and Archaeology magazines are excellent sources for good, picture-filled references to archaeological sites that will give students a good idea of what sites look like and in what types of settings sites are found.

3. Discuss threats to archaeological sites. Any activity that disturbs the ground can harm a site. Threats that should be mentioned include road, powerline, and building construction, farming, energy exploration, dam construction and water control, timber harvesting, and artifact collecting. All of these destroy the in situ relationships of artifacts, thus reducing or eliminating the amount of information that can be obtained by archaeologists.

4. Using large sheets of paper, have students draw pictures of archaeological sites and pictures of threats to sites. Students could also make a collage of pictures clipped from various magazines.

5. Discuss what can be done to protect archaeological sites. Mention legislation that protects sites, and what students can do as individuals. (See Section E: Protecting Our Heritage.)

ORAL HISTORY

Purpose: This activity will help students understand how cultures without writing pass on information about themselves. It may also be used to discuss how some events become recorded (in writing or memory) and others do not.

Before Europeans came to the New World, most American cultures did not have a written language. To pass on their history, the Indians used pictures and symbols and oral histories. Oral histories were passed down from generation to generation through the telling and retelling of events. Sometimes these events became myths. Myths were developed in this way all over the world. They are stories about how things came to be the way they are, and they often teach values and history.

Procedure:

1. Have students research one category of myth: creation of the world, creation of animals and plants, creation of people, floods, origin of fire, origins and activities of gods and deities, relationships among animals, cultural histories, and so on.

2. Have students discuss how myths from different cultures are similar to one another and how they are different. Why are they similar (e.g., same experiences--dealing with droughts, use of fire) and why are they different (e.g., desert dwelling peoples' myths differ from island people's myths because of environment)?

3. Have students work together in small groups to develop a myth about an event or important object in their own lives. For example, a myth might be developed about the television, about a football game, or about the building of a road or shopping center. At this stage, the students should develop the myth as oral tradition and should rehearse the myth as they would a play or speech.

4. Have each group share their myths with the other groups. Which group told their story best? What factors made them good storytellers? This can be made into a listening exercise by having someone in another group retell the myth they just heard.

5. Have each group write the myth down, but don't let them keep a copy of their myths. After a week or two, have them tell their myths again. How have the myths changed? Have the students speculate: How would the myth change after a year, after 10 years, after 100 or 1,000 years? Reexamine the "real" myths studied by the students. Have the students imagine the real events that caused the creation of the myth. What events in prehistory would make people create a myth? Could myths have been created purely for entertainment, and in that case, would they be myths or stories?

HOHOKAM DANCING

Purpose: To explore the creativity of the Hohokam by trying to reconstruct their dance (and music?) through pottery design.

From about A.D. 700 to 1000, Hohokam pottery makers often decorated their jars and bowls with figures of people dancing and playing musical instruments. Many petroglyphs (drawings pecked into rock) also show dancers and musicians. Although we do not know why they danced, or what their music sounded like, we do know that dancing and music were important to the Hohokam.

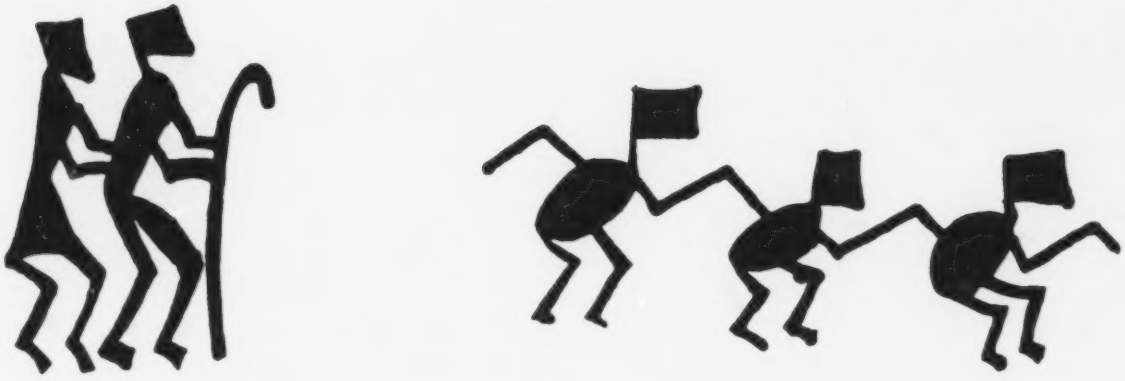
For this activity, you can start with the figures provided on the next page. Find a tape or tapes of American Indian music (flute and drum-type. Suggested sources: Arizona State Museum, Arizona Historical Society, Gila River Indian Arts and Crafts Center, San Xavier Gift Shop—but stay away from Waila or Chicken-scratch music), Heard Museum, Arizona-Sonora Desert Museum, Museum of Northern Arizona. Pick a piece with a strong beat.

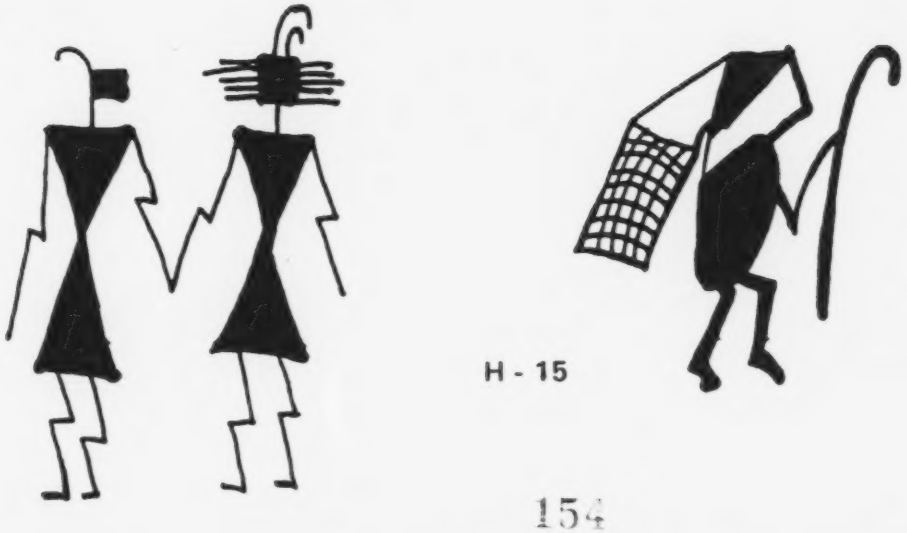
1. While listening to the music and using the figures provided, have the class decide what type of dance was being performed or what musical instrument is depicted and what it sounded like. (This could also be done in smaller groups or by individuals.)

2. Try to reproduce the dance—develop rules and dance steps, keeping in mind that many modern-day Indian social dances look sedate—side slides and small steps.

3. Try to reproduce the instruments: Rattles were made from gourds (gourds, kleenex boxes, toilet paper rolls filled with pebbles will work); Tinklers (not depicted) wrapped around ankles and wrists were made from deer hooves or cocoons (try using bells, empty thread spools, or a similar material strung together); Flutes and whistles were made from bone, wood, or reed (plastic pipe and bamboo work fine—recorders are an adequate substitute); Drums, rasps, and other rhythm instruments were of wood and hide (use the available rhythm instruments, avoiding metal). For those with strong lungs, Strombus shells can be converted into trumpets.

4. Discuss dancing and music. Why are they important to the Hohokam? Were dances used to celebrate, commemorate, or socialize? Can dances be used to tell stories? Why are dance and music important in our culture? How do modern American dances and music differ from traditional Indian dances and music? Compare the music and dance of other cultures as well.





H - 15

STRINGS AND THINGS

Purpose: To help students hone their observational skills and begin to translate what they see on to paper—through pictures or writing.

For this activity, you will need several 3-foot-long pieces of string. The number will depend on how you divide your class. Paper and pencils are a must. Clipboards are helpful; graph paper may also be used.

1. Divide your class into groups, and go out to a quiet spot on the school grounds. Have each group lay their string out in a straight line. Have them follow the string, carefully recording everything that lies along the path—plants, artifacts, pebbles, insects, whatever. Students can name each one or begin to quantify their observations on a chart — 10 pebbles, 3 pop tops, and so on. Have them observe the earth. Is it loose or hard? Why? They should include a description of the soil on their chart.

2. Students may also map the objects along their string. Do the objects seem to be distributed in a certain way?

3. Have the students make the string into a circle and repeat the exercise. What were the differences between the circle and the line in the pattern of objects seen and the types of objects found?

4. Have the students compare their results with one another. Were there differences in how each area was used that resulted in differences in their drawings and charts?

NATURAL RESOURCES

Purpose: To explore how people from different cultures use their environment.

For this activity, you'll need encyclopedias and magazines such as National Geographic and Natural History.

1. Have the students pick an archaeological culture they would like to learn more about. Have them make a list of the artifacts used by that culture. Then, have them decide where and how the ancient people got the natural resources to make those artifacts.

2. Now, have the students pick a modern culture in the same part of the world, and repeat the procedure.

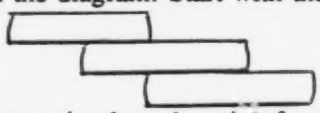
3. Have them compare natural resource use. Which culture uses more resources—the archaeological culture or the modern culture? What differences are there in resource use from the past culture to today's? Why are there differences?

DATING WITH TREE RINGS (DENDROCHRONOLOGY)

The purpose is to allow the students to try their hand at a real dating method—tree-ring dating or dendrochronology.

On the next page are sections of five trees showing the pattern of their rings. The trees lived at different times, but some of the years overlap between the trees. By matching the overlapping patterns of rings, scientists can build a longer set of years—a chronology.

1. Make enough photocopies of the strips so that each student or group of 3-4 students has a set. Cut out the strips (or have the students cut them out) and have the students try to match overlapping patterns, as in the diagram. Start with the 1985 bark edge and work backwards.



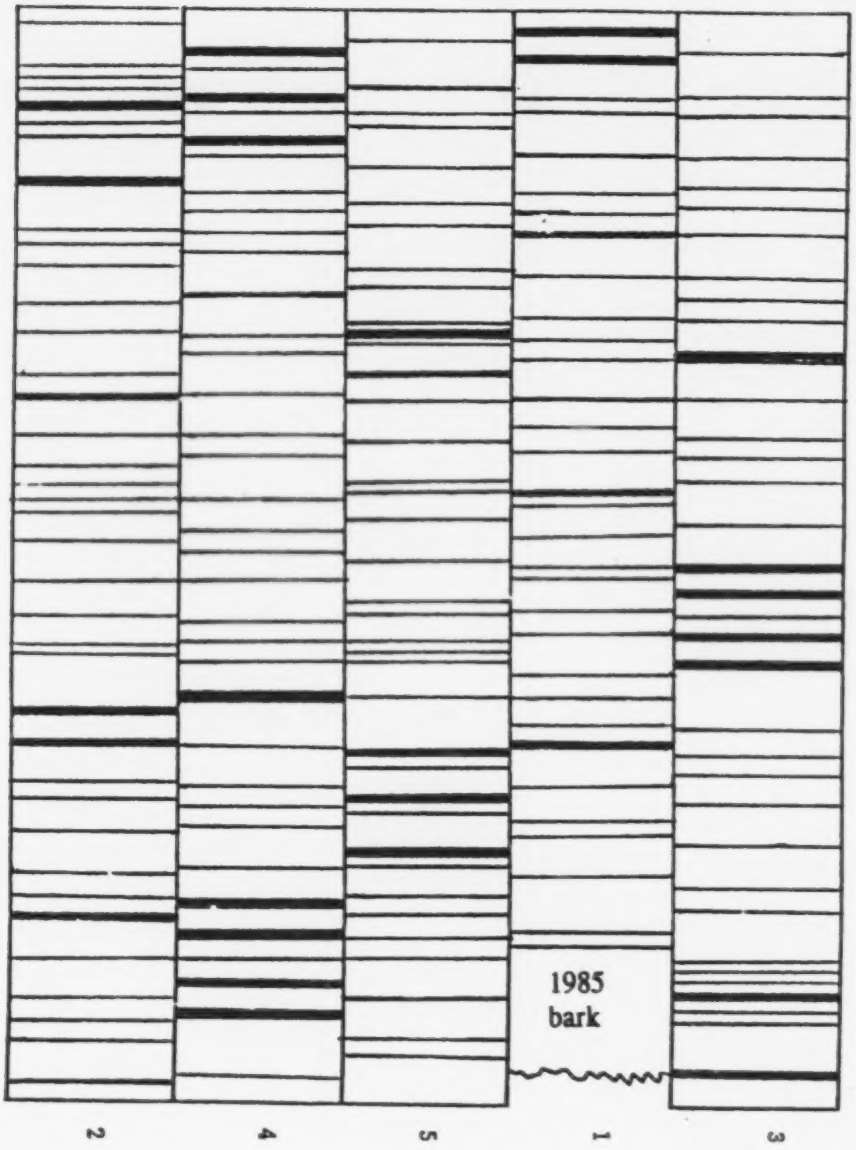
2. Although the process seems simple and straightforward, there are many problems associated with tree-ring dating. First of all, is the tree a species that can be dated—conifers such as Douglas fir and ponderosa pine work best. Cottonwood and mesquite can only rarely be used. If a tree was growing in a stressful environment (not quite enough water, a bit too cold) it will provide a highly variable set of rings—some wide, some narrow. This is great for trying to use the tree for dating, but can also mean that the tree put on no rings in some years—leaving a gap in the tree's "personal" chronology.

The prehistoric inhabitants of the Southwest were terrific recyclers. They often used old wood, scavenged from abandoned houses, to build new ones. If a tree was too large, or not straight enough, they might "skin" the outside of the tree, leaving us with a "missing ring" problem--how many rings are missing from the outside. Archaeologists must determine if the wood they find is structural—used in building a room or house—or nonstructural—used for firewood or something else. Firewood is almost always "old" wood, scavenged and not cut, and may represent an event 100 years earlier than its actual use in the fire.

Discuss with the students the problems that can arise when trying to use tree-ring dates.

3. An alternative to the strips we've included is to use bar codes from store items, pasted on a strip of paper. Bar codes can then be matched in a manner similar to these strips.

4. Or, call the local U.S. Forest Service Office and ask if they have any increment bore samples that can be used to demonstrate dendrochronology. (The increment bore is the tool used to core a tree to obtain a sample.) Another source of tree cores might be the University of Arizona's Tree-Ring Laboratory.


1985
bark
2
4
5
1
3

HOW DO YOU MEASURE UP?

Purpose: The goal of this activity is to familiarize students with the metric system.

Procedure: You will need meter sticks or tape measures with centimeters marked on it, and pieces of string about 2 meters long (to measure things such as the circumference of heads). Students will need to work with one or two partners.

Measure the following:

1. circumference of head _____

2. circumference of neck _____

3. width of back shoulders _____

4. length of nose _____

5. length of ear _____

6. waist _____

7. length of ring finger _____

8. length of little finger _____

9. thumb, from knuckle to tip _____

10. hand spread _____

11. wrist _____

12. elbow to wrist _____

13. knee to ankle _____

14. foot (length and width without shoe) _____

15. shoe (length and width) _____

16. height _____

17. top of desk (width and length) _____

18. pencil (diameter and length) _____

19. writing paper (length and width) _____

20. book (length, width, and thickness) _____

21. length of classroom (front to back) _____

22. width of classroom (side to side) _____

23. door (width and height) _____

Have the students discuss how they would measure things in an archaeological site. What kinds of things should be measured? How should those measurements be recorded? If an excavation area was as large as the classroom, or the school, how would you go about measuring it? What parts of it would be important to measure?

MOTEL OF THE MYSTERIES

Motel of the Mysteries, by David McCauley, is a book that can be used to get children to think about how archaeologists interpret sites. Because it is a spoof of real archaeology (Henrich Schliemann's excavation of Troy and Howard Carter's discover of King Tut's tomb) the book can also be used as a jumping off point for those interested in doing further research. The activity discussed here is to help students understand how their culture and understanding of history affects the way they perceive past cultures.

1. Introduce the lesson by reading pieces from the beginning of the book—the "facts" about the discovery, the time period, and so on. Completely reading the first section at this point might be a bit tedious, so stick to a minimal amount. (You can get along without the introduction.)

2. Pass out photocopies of the pages from the section marked "The Treasures" to students. Then, read descriptions of the "treasures," asking students to hold up the artifact that is being identified (watch for silliness when the skull in shower cap and toilet bowl are described).

3. Now, using information from the remainder of the book—the drawing of the freeway, "Monument Row," the motel—discuss with students why they think the archaeologists interpreted the artifacts in the way that they did. What sort of culture do the archaeologists come from that would prompt them to think the way they do about these artifacts? (For example, do the future archaeologists use toilets, toothbrushes, and showers that look like ours? Do they have televison?)

4. Have the students think about the accuracy of our archaeological interpretations. How do we know that kivas were used for ceremonies by the Anasazi? (Some archaeologists think that prehistoric kivas were houses, and not religious or communal structures.) Do archaeologists know that Hohokam ballcourts were used for ballgames? (Other ideas are dancing plazas or trading areas—early swap meets.)

5. This may lead into a discussion of the "aliens from outerspace" explanation for all that is unknown about archaeology. Using Van Daniken's Chariots of the Gods?, have the students research the things discussed in the book. National Geographic, Natural History, and Archaeology are good sources of accurate information, as is the Time-Life Time-Line series. Other sources of sensationalist misinformation are the grocery store tabloids—The National Enquirer, The Star, etc. You can develop good discussions on the differences between fact and speculation, ethnocentrism (i.e., "those people in the past were stupid and couldn't figure out how to do things for themselves"), and scientific method using a combination of these sources.

6. As mentioned earlier, Motel of the Mysteries is based on two "high profile" excavations and finds—one by Heinrich Schliemann at Troy in the late 1800s and one in Egypt by Howard Carter in the 1920s. The finds are discussed in many books on world archaeology. Good summaries can be found in Fagan's book, The Adventure of Archaeology, published in 1985 by the National Geographic Society. (Its a book that should be in every school library!)

CULTURE UNIVERSALS

This activity was developed by Jeanne Miller, who teaches in the Chandler School District. She uses it in her classrooms and in the Archaeology for the Schools Committee workshops.

Purpose: To have students apply their knowledge of cultural universals by completing a worksheet on how artifacts reflect or represent a culture.

You will need copies of the worksheet on the next page, pencils, and old magazines (one for each student).

1. Divide the class into groups of 3 or 4. Pass out the magazines and have each student go through the magazine, tearing out pictures of objects—motorcycles, perfume bottles, shoes, baby clothes, houses, and so on.

2. Next, working in their groups, and using the cultural universal worksheet, have each group organize their pictures into the categories listed. Pictures may have more than one category. For example, motorcycles could be placed under Economics, Transportation, but bikers would argue that motorcycles also fall under Values or even Political Organization, Games; perfume bottles might fall under Aesthetic, Art, Values, or perhaps Livelihood, Clothing. The groups should entertain discussion, but should reach mutual, reasoned decisions about their choices.

3. Have each group present their list and their reasons for placing objects in each category.

4. Have the students repeat the exercise using the following list of objects from the Hohokam culture:

flute	loom	small animal trap
woven mat	hammer stone	jar
basket	etched shells	mano
metate	ring	worked bone
arrow straightener	parrot feathers	stone hoe
digging sticks	turquoise	scoop
pyrite mirror	abalone shell	copper bell
red-on-brown bowl	petroglyphs	mortar
polishing stone	projectile point	plain ware jar
spindle whorl	burial offerings	cotton cloth
agave cordage	nose plug	incense burner
pestle	stone ax	burned corn cob

CULTURE UNIVERSALS SHEET

I. Livelihood

A. Food _____

B. Clothing _____

C. Shelter _____

II. Family

A. Marriage _____

B. Children _____

III. Political Organization

A. Government _____

B. War _____

C. Games _____

IV. Knowledge

A. Language _____

B. Number system _____

V. Religion

A. Beliefs _____

B. Mythology _____

VI. Values/Visual Symbols of Principles _____

VII. Aesthetics

A. Visual Art _____

B. Music _____

C. Dance _____

VIII. Economics

A. Trade and Money _____

B. Transportation _____

C. Labor _____

IX. Technology _____

MAPPING

At Camp Cooper, we use an x-y coordinate system to map artifacts and features. As we discovered while working with teachers, there are two ways to understand this system, one using spaces and one using lines. In Archaeology Is More Than a Dig, the "spaces" system was used. We use the "line" system. We have adapted the following "spaces" exercises from Archaeology Is More Than a Dig and have made them into "line" exercises. Either way of teaching mapping works. The goals of the mapping exercises are to 1. have students practice identifying mapping coordinates, 2. have students practice drawing to scale, 3. have students transfer written information to a map, and 4. practice using the provenience unit maps that are used at the Camp Cooper site.

You will need pencils, photocopies of each map to be used (enough for each student), and for Map #4. masking tape and metric sticks.

Map # 1. Using the lower left hand corner as the coordinate for the square in question, have the students name the grid squares where the Indian designs are located. For example, the bee is in grid 5A 4U.

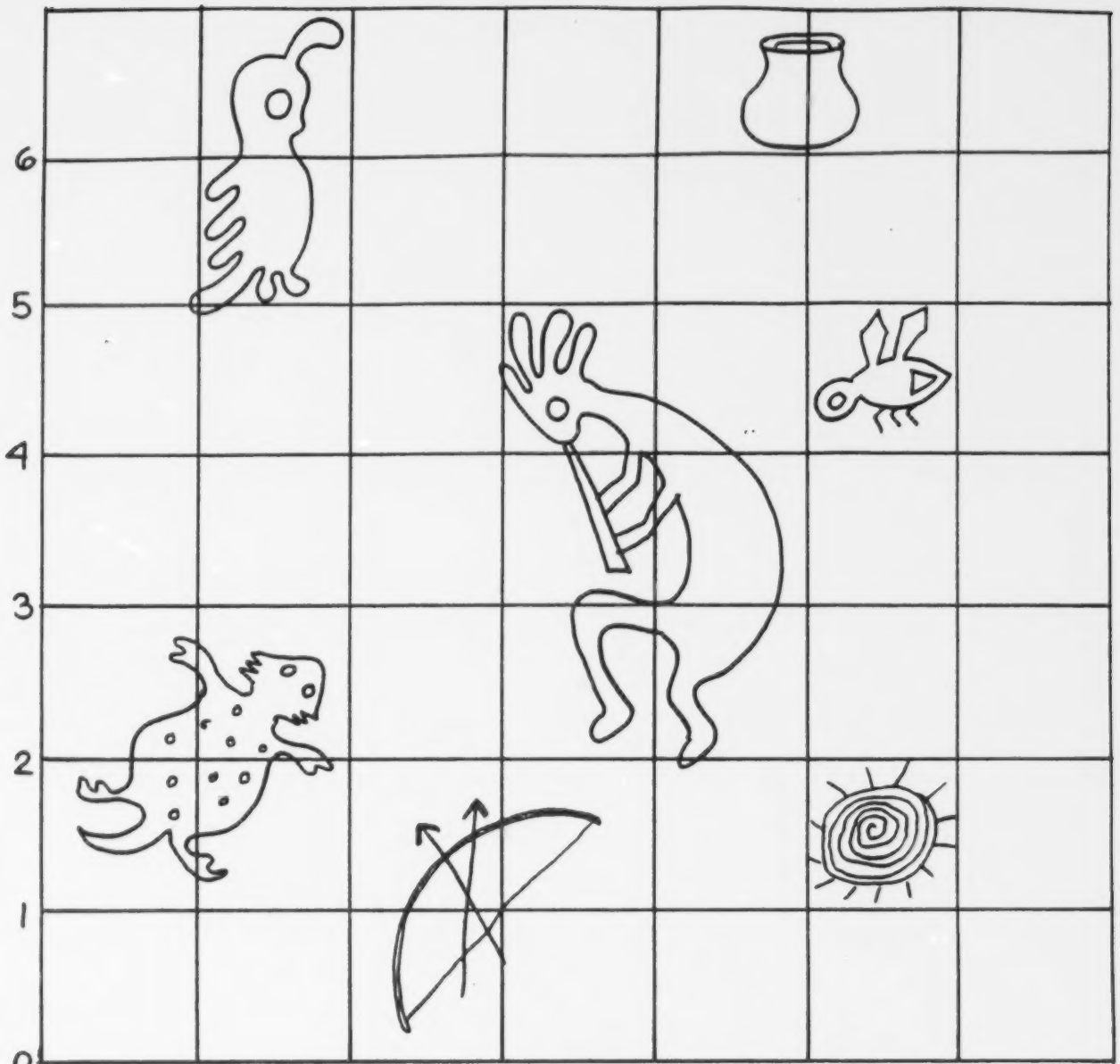
Map # 2. Have the students draw a smaller version of the pot to scale in the blank graph provided. Be sure the pot is placed in the correct grid squares.

Map # 3. Following the coordinates given in the map key, have students draw the artifacts in the correct grid squares. Make students label the objects on their map or have them develop a key that is coded to the objects on the map.

Map # 4 and Map # 5. These are the grid maps that we use at the Camp Cooper dig. Map # 4 has been filled out and a key provided as an example of the types of things students will be drawing at Camp Cooper. Map # 5 is a blank for your use.

To practice drawing in metric, using the grid maps provided, we suggest the following.

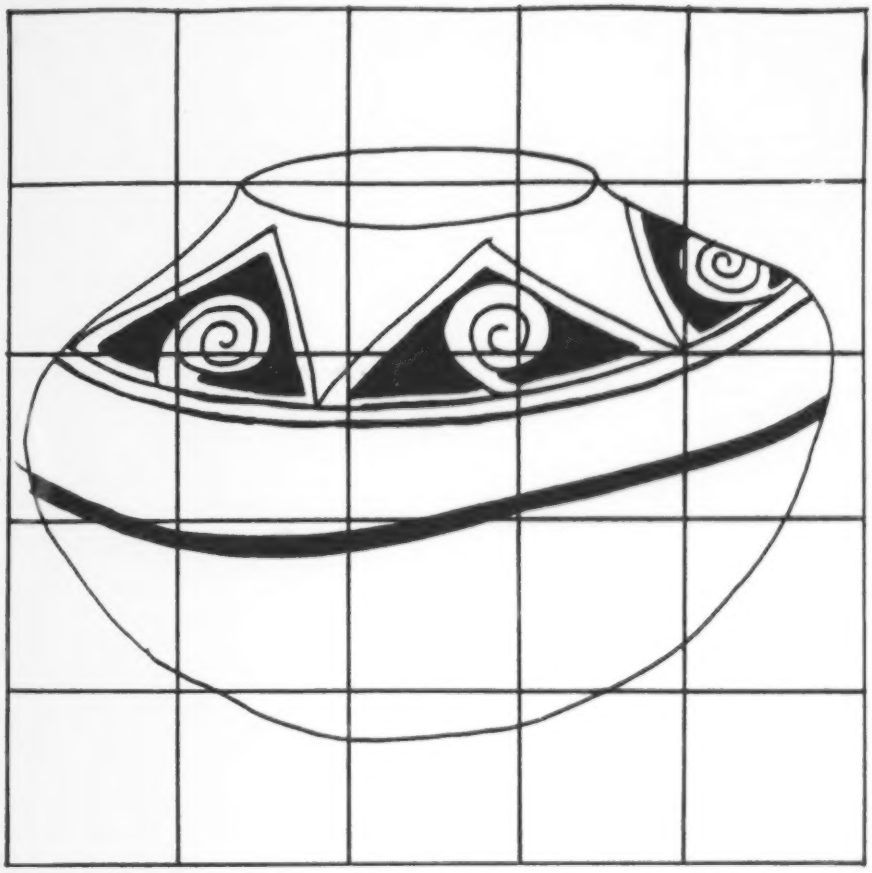
Using masking tape, lay out a 2-meter by 2-meter grid, with string inside for grid lines at 20-cm intervals. Try to orient your grid north-south. Place artifacts and feature outlines (paper cutouts of pit houses, hearths, etc.) within the grids, and have each student (or each digging group) map the artifacts within the grids. Be sure the students label the objects they draw or provide a key, and have them take notes on what activity or activities are represented by the artifacts and features.

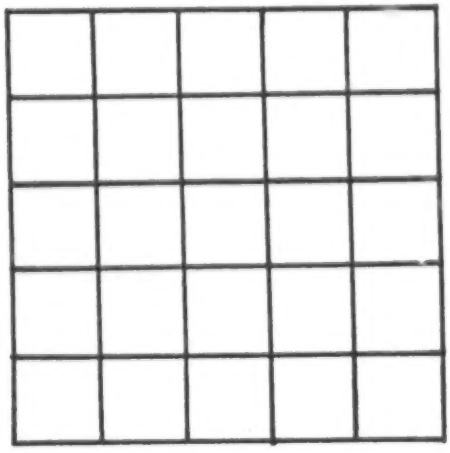


MAP 1

Name all the grid squares where the Indian designs are located.
U=up A=across
Example: The bee 5A 4U

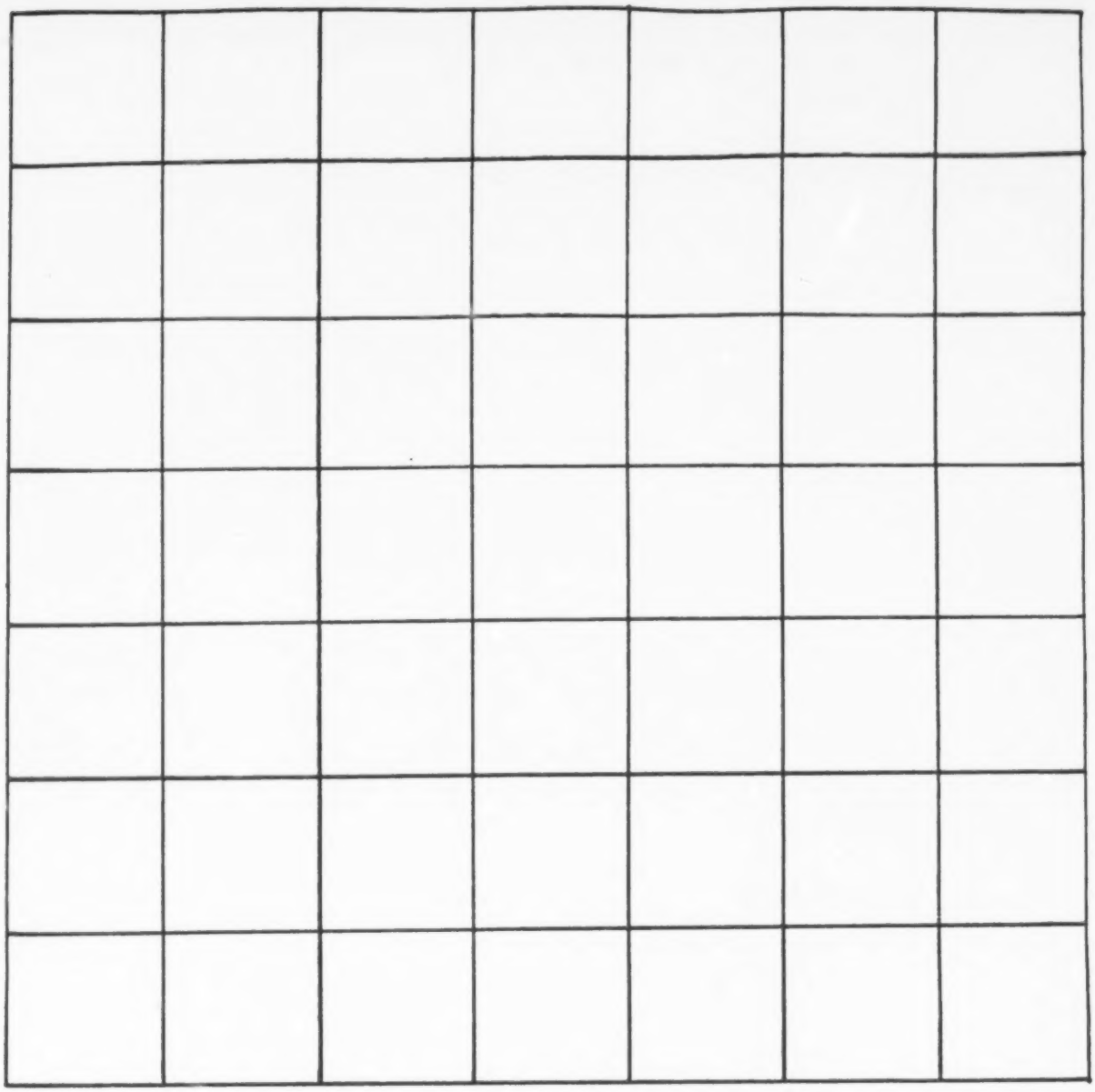
1. the quail ___ ___
2. the sun ___ ___
3. the bow and arrows ___ ___
4. the small pot ___ ___
5. the horned lizard ___ ___
6. the flute player ___ ___ ___ ___ ___ ___ ___





MAP 2

Draw a smaller version of the pot to scale on the graph provided. Be sure that you place it in the correct grid squares.



MAP 3

Draw the artifacts in the correct grid squares.
KEY -- U = up, A = across

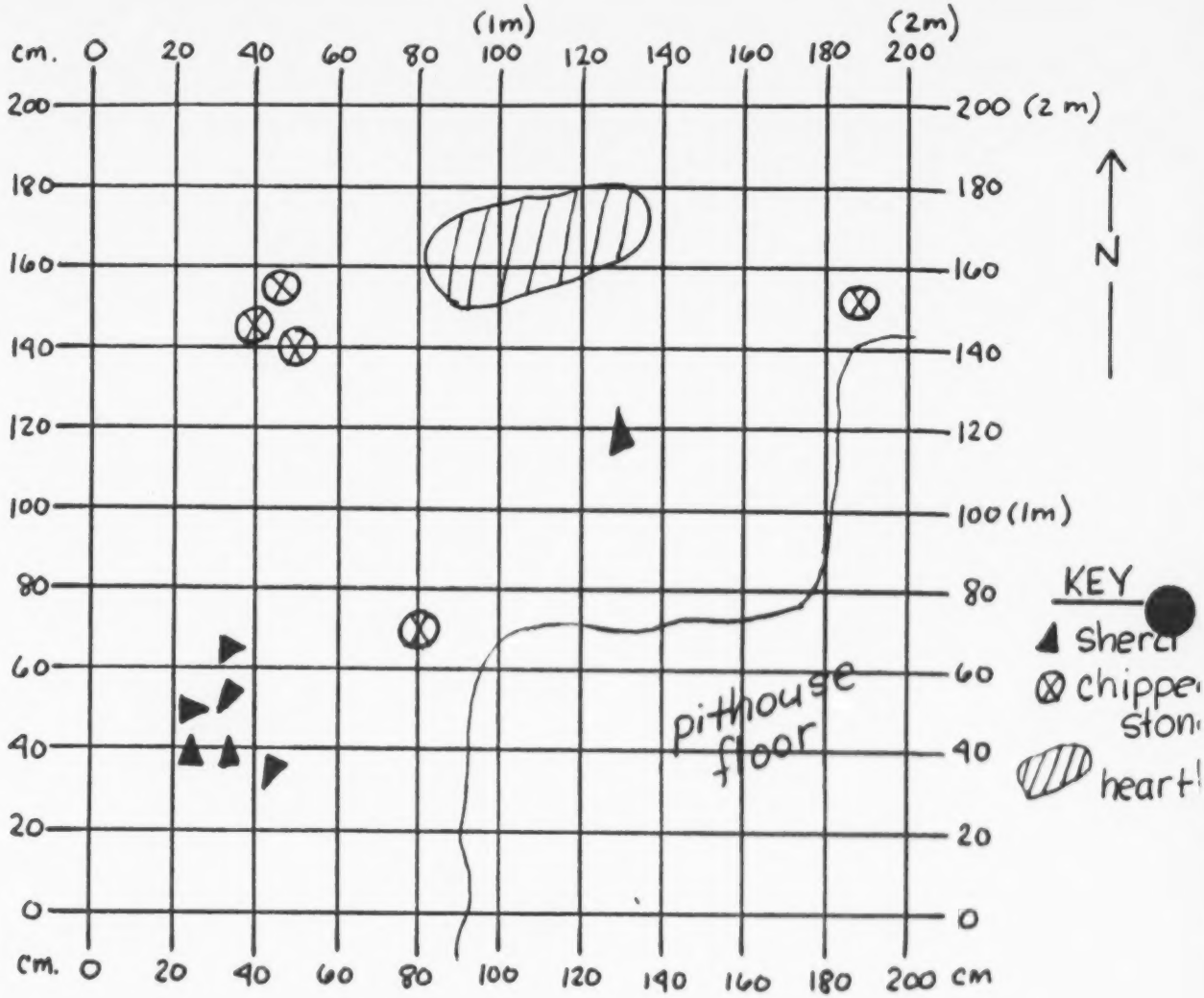
1. 4 flakes 4A 2U
2. A shell bracelet 5A 1U, 6A 2U
3. 1 pottery sherd 1A 2U
4. A metate 0A 0U, 1A 0U, 2A 0U
5. A mano 1A 1U
6. 2 small beads 0A 6U
7. A projectile point 2A 5U, 3A 5U
8. A fire pit 4A 4U, 4A 5U, 4A 6U, 5A 6U, 6A 6U, 5A 5U, 6A 6U, 5A 4U, 6A 4U

MAP 4

SITE NAME _____ DATE _____

EXCAVATORS'NAMES _____

PROVENIENCE UNIT _____ LEVEL _____



WHAT DID YOU DRAW? _____

_____

_____

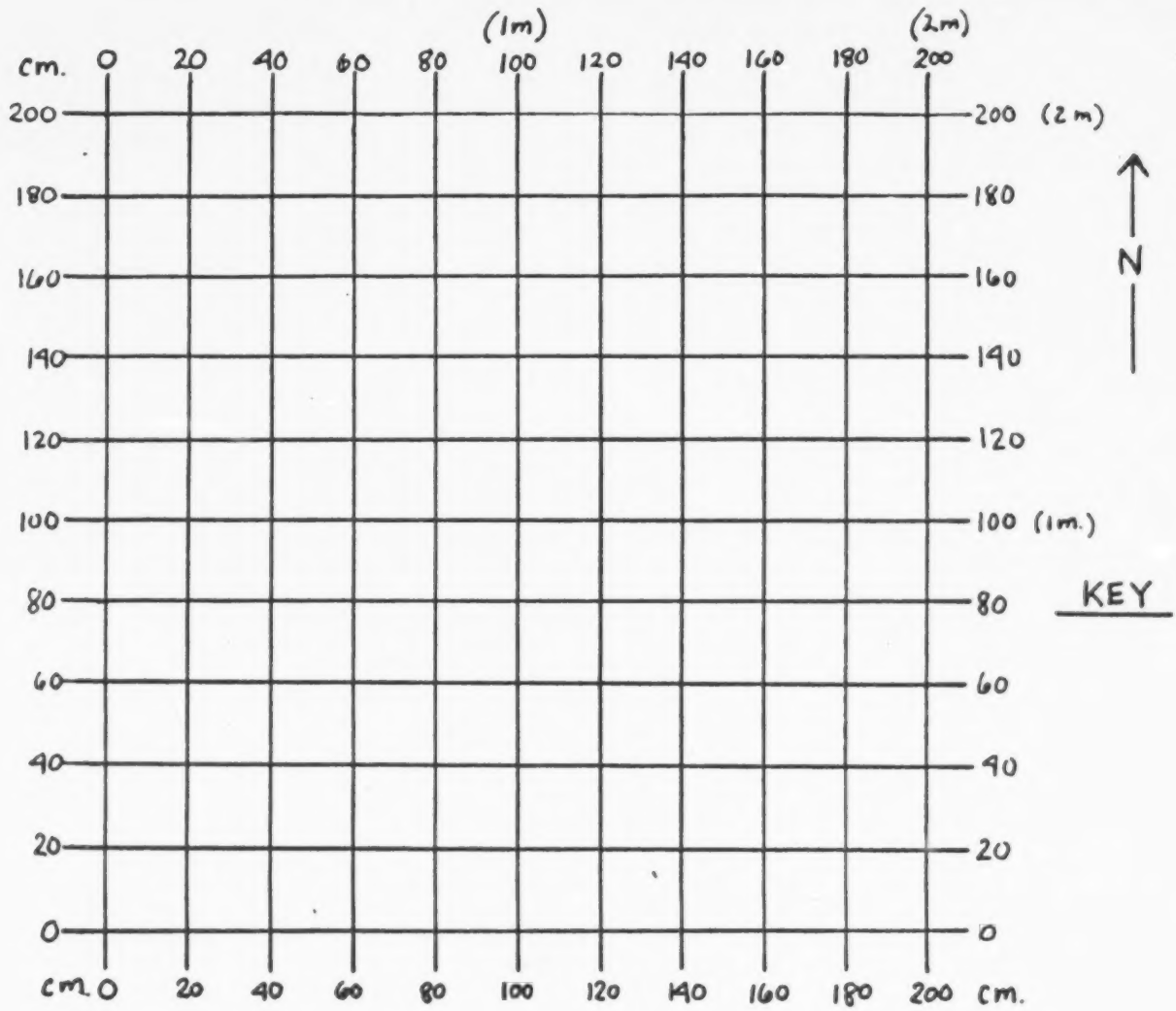
_____

MAP 5

SITE NAME _____ DATE _____

EXCAVATORS'NAMES _____

PROVENIENCE UNIT _____ LEVEL _____



WHAT DID YOU DRAW? _____

_____

_____

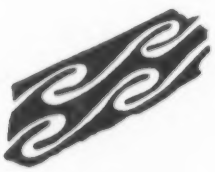
_____

ARCHAEOLOGY WORD SEARCH

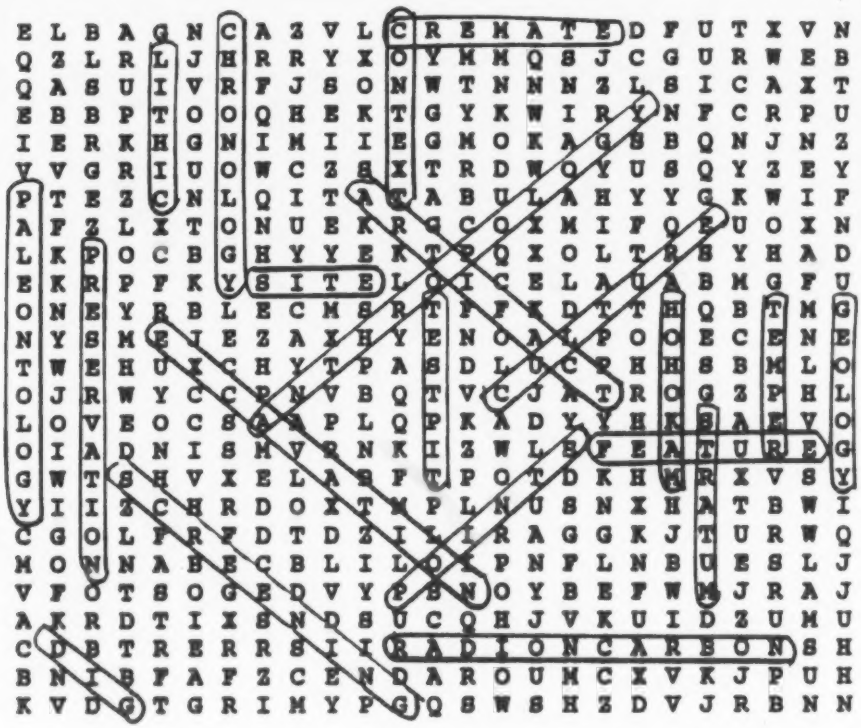
E L B A G N C A Z V L C R E M A T E D F U T X V N
Q Z L R L J H R R Y X O Y M M Q S J C G U R W E B
Q A S U I V R F J S O N W T N N N Z L S I C A X T
E B B P T O O Q H E K T G Y K W I R Y N F C R P U
I E R K H G N I M I I E G M O K A G S B Q N J N Z
V V G R I U O W C Z S X T R D W O Y U S Q Y Z E Y
P T E Z C N L Q I T A T A B U L A H Y Y G K W I F
A F Z L X T O N U E K R G C O X M I F Q E U O X N
L K P O C B G H Y Y E K T P Q X O L T R S Y H A D
E K R P F K Y S I T E L O I C E L A U A B M G F U
O N E Y R B L E C M S R T F F K D T T H Q B T M G
N Y S M E J E Z A X H Y E N O A L P O O E C E N E
T W E H U X C H Y T P A S D L U C P H H S B M L O
O J R W Y C C P N V B Q T V C J A T R O G Z P H L
L O V E O C S A A P L Q P K A D Y Y H K S A E V O
O I A D N I S M V R N K I Z W L S F E A T U R E G
G W T S H V X E L A B F T P O T D K H M R X V S Y
Y I I Z C H R D O X T M P L N U S N X H A T B W I
C G O L F R F D T D Z I L I R A G G K J T U R W Q
M O N N A B E C B L I L O I P N F L M B U E S L J
V F O T S O G E D V Y P B N O Y B E F W M J R A J
A K R D T I X S N D S U C Q H J V K U I D Z U M U
C D B T R E R R S I I R A D I O M C A R B O N S H
B N I B F A F Z C E N D A R O U M C X V K J P U H
K V D G T G R I M Y P G Q S W S H Z D V J R B N N

Can you find these words:

ANTHROPOLOGY	EXCAVATION	PRESERVATION
ARTIFACT	FEATURE	RADIOCARBON
CHRONOLOGY	GEOLOGY	SCREENING
CONTEXT	HOHOKAM	SITE
CREMATE	LITHIC	STRATUM
CULTURE	PALEONTOLOGY	TEMPER
DIG	POINTS	TESTPIT



ARCHAEOLOGY WORD SEARCH ANSWERS



ANSWERS TO QUESTIONS ON THE ILLUSTRATIONS

Section A

Figure A.a. An Eskimo standing beside an igloo equipped with a satellite dish represents the field of cultural anthropology. The four languages shown as examples of linguistics are (top to bottom) Russian, English, Japanese, and Spanish.

Figure A.b. The human skull that the pothunter is holding in his right hand indicates that he has been digging in a cemetary site or in a burial.

Figure A.c. From left to right, the figures represent a deer or pronghorn, a turtle, and a fish.

Figure A.d. The historic period in Egypt begins around 3100 B.C. The historic period in the Mayan area begins around 36 B.C. The historic period in Egypt is about 3,000 years older than the historic period in the Mayan area.

Figure A.e. No "real" answer. Archaeologists are not sure what these petroglyphs mean. On the top panel, the large objects that the two human figures are holding could represent *pahoes* or ceremonial prayer sticks. Could the upside-down figure on the bottom panel represent a warrior?

Figure A.f. Pottery sherds are the most numerous. There are 12 sherds, 5 projectile points and fragments of projectile points, 1 petroglyph panel, 1 mano, and 1 metate shown in the drawing.

Figure A.g. Clockwise from top left are the aluminum pop top from a soda can, a glass whiskey bottle, fragments of glazed white earthenware plates, a glass beer bottle base, glass beads, a horseshoe fragment, tin a can, the neck and mouth of a glass whiskey bottle, a pocketknife, glass beads, a machine-made round nail, a hand-wrought iron nail, a machine-made square nail, and glass beads.

Figure A.h. Archaeologists rarely find the remains of prehistoric clothing because the organic material that clothing is made from, such as cotton cloth, hide, and reeds for sandals, deteriorate unless they are protected from the weather. When prehistoric clothing remains are found, it is usually because the material has been burned or deposited in a dry cave.

The clothing shown in figures a and b was probably made of cotton cloth. The jewelry shown in figures a and b includes feathers, shell, and possibly stone beads. The male figurine in figure c is wearing a kilt, possibly made of woven cloth (made from cotton, agave, or a plant called *apocynum*) or hide. His jewelry includes a probable shell belt and a shell or stone necklace. The female figurine in c is wearing a skirt that may have been made of knotted hide, woven turkey feathers, or cloth. Her belt could also represent cloth but is probably made of shell or stone beads. Her necklace is also probably made of shell or stone beads.

Figure A.i. Pit house 1 was built first. It is the oldest pit house. Pit house 3 was built last. It is the youngest pit house shown. When Pit house 2 was built, a corner of Pit house 1 was destroyed. A corner of pit house 3 was built on top of Pit house 2.

We think that a jar (in the northern part), a bowl and another pottery vessel (in the center), and a metate (in the southern part) are associated with Pit house 1. We think that because the artifacts were on the floor of Pit house 1. These artifacts are older than the artifacts found on the floor of Pit house 3.

Figure A.j. Several natural and cultural formation processes have caused the Hohokam site of Casa Grande to deteriorate. The natural formation processes include wind, rain, freezing, thawing, and insect and rodent activity. Some of the cultural formation processes that have contributed to the structure's deterioration include people carving grafitti on the walls, climbing over walls, taking wooden beams and other parts of the structure, and shooting guns at the walls.

Section B

Figure B.a. The tasks shown in the drawing include (clockwise from left) mapping the site using a plane table and alidade (an instrument that is similar to a transit), writing notes, excavating grid units, excavating whole pots using a trowel and paint brush, and examining a Hohokam figurine.

Figure B.b. The survey area covers about 4.5 square miles.

Figure B.c. The northwest corner of the ramada is at 5N1E. The northeast corner is at 5N3E. The southeast corner is at 1.5N2.5E. The southwest corner of the ramada is at 1.5N.5E. The lines of rocks in the northern part of the grid represent an irrigation ditch or canal.

Figure B.d. It is important to know and record the depth of artifacts and features at a site because the depth in relation to other features or artifacts tells the archaeologist whether the artifact or feature is older or younger than other artifacts or features. Knowing depth is a way of determining the relative dates of the artifacts and features at a site.

The figures in the illustration represent the Hohokam culture. Figures similar to them can be found on Hohokam pottery and rock art.

Figure B.e. Level 2 contains the burned corn kernels.

Figure B.f. The fifth group of bags from the top should be used for the artifacts from Occupation Surface 2 and the bags at the bottom of the illustration should be used for artifacts from Feature 2.

Figure B.g. Pollen grains recovered from a prehistoric site can indicate what may have been stored in ajar or what kinds of plants were around the site. The information from pollen grains helps archaeologists discover what kinds of plants the prehistoric people may have used. This information also helps archaeologists reconstruct what the environment around the site was like and how the plant community changed through time. Fossilized pollen grains can help *paleontologists* determine what the environment was like millions of years ago.

Figure B.h. Archaeomagnetic dating produces an absolute or calender year date.

Section C

Figure C.a. The Archaic period lasted the longest--a little over 8,000 years. We are now in the Historic period.

Figure C.b. The Bering Land Bridge that linked North America and Asia during the last Ice Age is now under water. The reason that it is inundated is because the sea level rose when the ice sheets melted.

Figure C.c. In southern Arizona, mammoths and saber-toothed cats lived in an environment that was wetter and cooler than it is today. Grass, shrubs, and trees like pinyon pine and oak grew in areas that now have cactus and palo verde.

Figure C.d. The Archaic period people hunted deer, pronghorn, bighorn sheep, and rabbits. They also probably hunted rodents and birds.

Figure C.e. Corn (maize) was first domesticated in central Mexico about 7,000 years ago (5,000 B.C.).

Figure C.f. Flagstaff represents the northernmost occupation of the Hohokam. Four states — Arizona, Utah, Colorado, and New Mexico — have prehistoric Anasazi sites.

Figure C.g. The activities shown in the illustration include (left to right) scraping hide on a wooden frame, playing a game with stone or shell counters, eating food cooked in ceramic cooking pots, cooking food in a ceramic cooking pot, combing or braiding hair, walking, taking a break from grinding some type of material on a metate, and smoothing and polishing an object.

Archaeologists are likely to find the following artifacts and features that represent the remains of Hohokam village life: the post holes and plastered floors of the pit houses, the gaming pieces (although archaeologists might not identify them as gaming pieces), hearths, ceramic pots, grinding slabs, paint pigment, polishing stones, post holes of the ramada, and possibly the jewelry the inhabitants wore.

These artifacts might be preserved if the village burned: the hide and wooden frame, the brush and wood from the pit houses, posts and brush from the ramada, the digging stick in the center of the illustration, and the burden basket leaning against the ramada post.

Figure C.h. The parts of Hohokam pit houses that last the longest and are most likely to be found by archaeologists are the plastered floor shown in Step 1 and the post holes shown in Step 2. Remains of the roof and walls of the pit house usually are not preserved, unless the brush and wood burned.

Figure C.i. The Salt River supplied water to the Hohokam canals, just as it supplies water to modern canals in Phoenix.

Figure C.j. Archaeologists think that ball courts were introduced into the Hohokam area from Mesoamerica. Some archaeologists think that "ball courts" may have been used for dancing because the Pima refer to one of the Snaketown ball courts as a dancing place and because dancing figures adorn some Hohokam ceramics and rock art panels. Also, Hohokam ball courts do not look very much like Mesoamerican ball courts.

Figure C.k. The arrival of the Spanish is considered to be the beginning of the Historic period in southern Arizona because the Spanish wrote descriptions of the people and land that they saw.

Figure C.l. The Maricopa, the Papago (Tohono O'odham), the Upper Pima (Akimel O'odham), and the Yavapai now live in the area that was once occupied by prehistoric Hohokam people. Thirteen modern and historic Pueblo Indian groups are thought to be the descendants of the prehistoric Anasazi people. These people are the Hopi, Zuni, Acoma, Laguna, Piro, Tompiro, Southern Tiwa, Pecos, Tano, Tewa, Northern Tiwa, and the Rio Grande Keresan Indians. The Navajo and Apache people migrated into the Southwest from Canada sometime before the 16th century when the Spanish entered the area. The Navajo and Apache languages belong to the Athapaskan language group. Athapaskan-speaking relatives of the Navajo and Apache still live in Canada.

Section E

Figure E.a. These signs are intended to prevent pothunting and looting of archaeological sites on National Forest land.